WESTERN GAS

S(200)
gW53

October
1932

HUNDREDS OF THOUSANDS OF

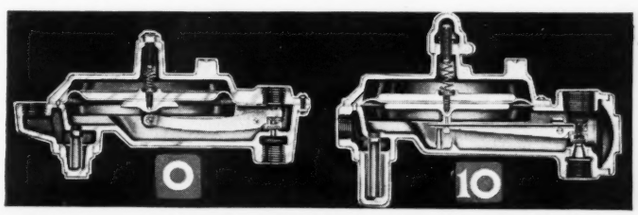
REYNOLDS REGULATORS

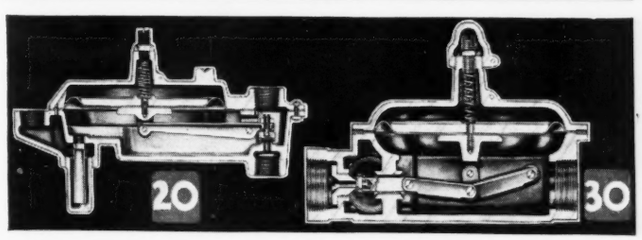
GIVING SATISFACTORY SERVICE

That is the guarantee behind REYNOLDS REGULATORS, no matter what type or model it may be. At the factory, Reynolds puts every regulator built to rigid inspections and tests to be sure that each regulator is in A number 1 condition before shipment. These inspections and tests must be a reliable guide for measuring the dependability and performance of Reynolds Products—otherwise, there would not be hundreds of thousands of them giving satisfactory service today. Reynolds manufactures a complete line of gas control regulators, each one of which can be depended upon to give quality performance for the work it is designed and built to handle.

Illustrated here are Reynolds Service Regulators—you can be sure that they will give reliable performance over a long period of time at a thrifty cost.

Write for details—direct to us, to our branch offices or our representatives. Also, Reynolds offers this service—co-operation of their Engineering Department to help you work out any gas control problem you might have.





MODEL 30 Spring or dead-weight type features toggle lever control. Made for any service requirement. Built in either Horizontal or Vertical Connections.

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REPRESENTATIVES:

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Anderson, Indiana, U. S. A.

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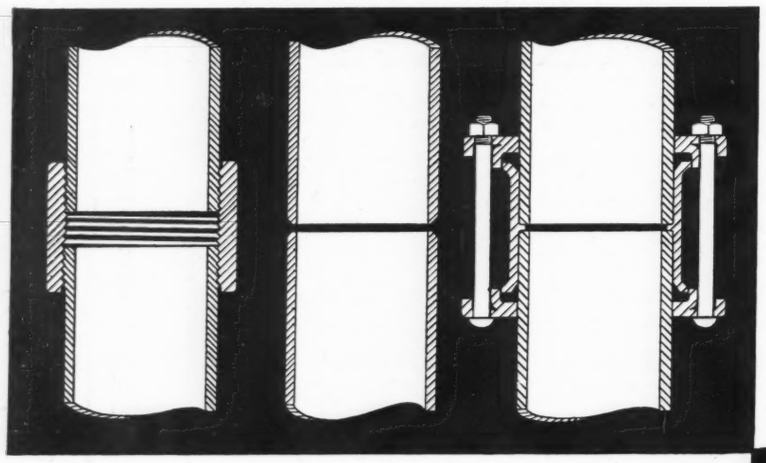
A MONTHLY JOURNAL DEVOTED TO THE WESTERN GAS & APPLIANCE INDUSTRIES

FINE FOR EVERY TYPE OF JOINT...



REPUBLIC ELECTRIC WELD PIPE...

EVERY pipe line engineer has his own preference for what he believes to be the best type of joint for each particular kind of line. His hardest job is to find the kind of pipe that works best with that type of joint. That's why there is a satisfaction in knowing that Republic Electric Weld Pipe is fine for every type of joint.

Perfect roundness, uniform thickness of wall, freedom from surface markings and projections, and straightness —these are the qualities of Republic Electric Weld Pipe that should influence its selection when joints are under consideration.

Roundness means ends that always butt together, are easily welded or fitted with mechanical couplings. Uniform wall thickness means uniform depth of metal at the root of the threads on coupled joints, and even heat penetration on welded joints. The smooth unmarred surface means absolute tightness when the gaskets of mechanical couplings are in place. And straightness means a quicker, cleaner job no matter what type of joint is employed.

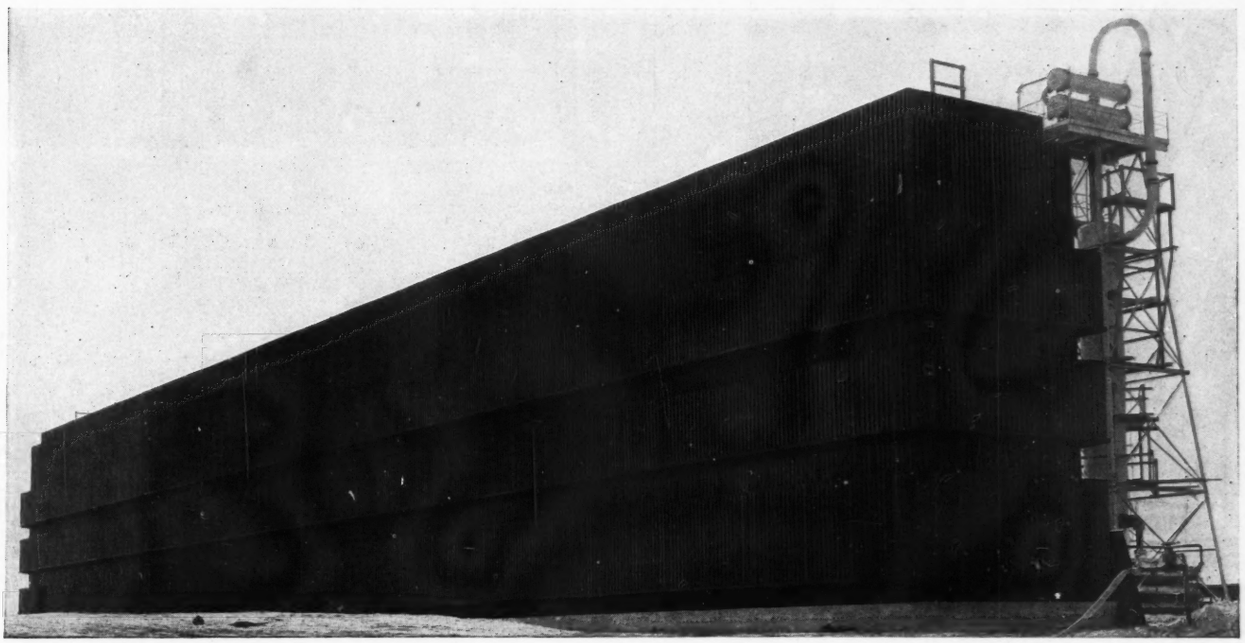
Another point worth remembering is that Republic Electric Weld Pipe can be supplied in lengths up to fifty feet, making far fewer joints necessary in the line. All sizes up to 16 inch O. D.

Write for Catalog 210-B, giving full engineering data and other facts about this remarkable pipe.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

Recent Installations include 13 States* and 2 Foreign Countries**



Unretouched photograph showing recent installation at Kettleman Hills where sudden and violent winds of from 30 to 40 miles per hour are not uncommon.

TREMENDOUS POPULARITY OF FLUOR AERATOR-TYPE COOLING TOWERS RESULT OF SOUND ENGINEERING

1. PRACTICAL ELIMINATION of wind blown spray; negligible loss at thirty miles per hour.

2. UNIFORM DISTRIBUTION from top to bottom assuring maximum efficiency of cooling surfaces.

3. POSITIVE LOW PRESSURE pipe distributing system; full allowance for inspection and maintenance.

4. FULL COOLING PERFORMANCE under any and all conditions; structurally strong; low operating cost.

5. UNIFORM MINIMUM overall width from top to bottom providing natural upward draft.

6. EXTENSION UPWARD to meet increased plant production without necessity of added ground area.

7. AERATOR-TYPE PERFECTED by actual installations in many states and foreign countries.

8. OLD-STYLE LOUVRES can be converted to Aerator-type on a basis of pay-out on water saving alone.

* Ohio, Texas, Kansas, Arizona, Arkansas, Illinois, Michigan, Missouri, Oklahoma, New York, Louisiana, California, Pennsylvania

** Canada, South America

FLUOR CORPORATION
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Fairfax Bldg..... KANSAS CITY, MO.

October, 1932, Volume VIII, Number 10, Western Gas is published by Western Business Papers, Inc., at 124 West Fourth Street, Los Angeles, California. Subscription price (in advance) 20 cents the copy; $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, under the Act of March 3, 1879.

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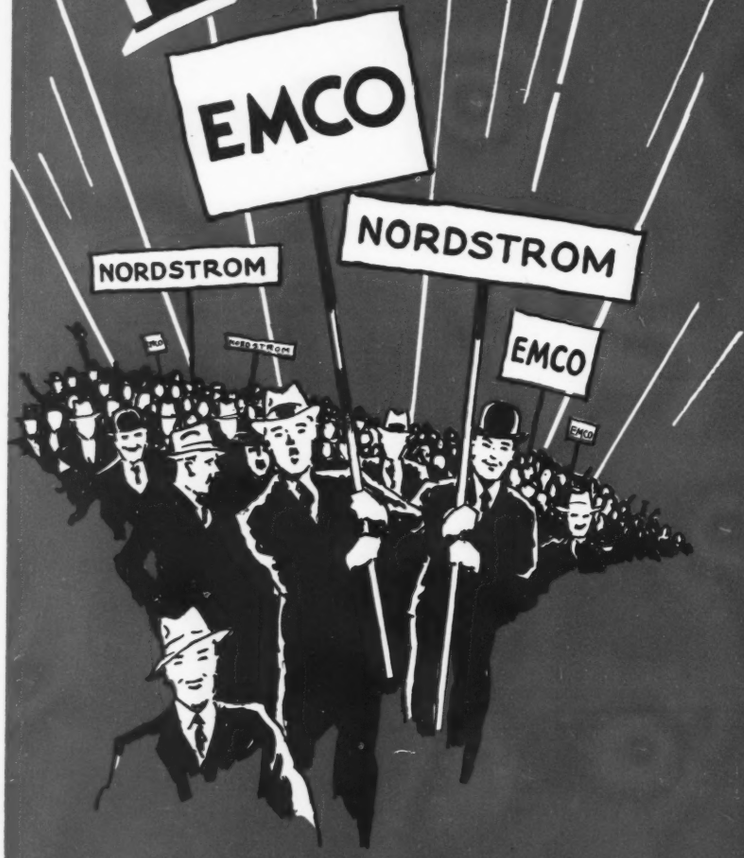

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the names **EMCO**
and **NORDSTROM**

are associated with equipment of only the very highest quality.

EMCO and NORDSTROM products are built from the finest raw materials, by the manufacturers of the largest and most complete line of lubricated plug valves, meters and pressure regulating equipment in the world.

EMCO and NORDSTROM products are playing an important part in the transmission and distribution activities of the manufactured and natural gas industries.

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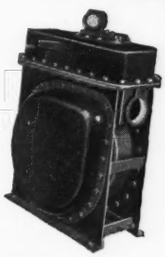

EMCO METERS

Made in a complete range of sizes, for every kind of service. No single type of meter is suited to all requirements. For this reason Pittsburgh Equitable builds a complete line of domestic and large capacity meters. Among them you will be sure to find an accurate meter that suits your requirements.

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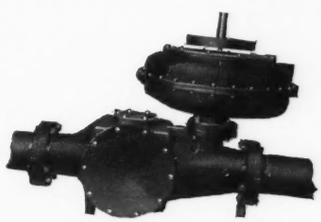
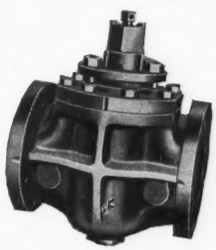


EMCO REGULATORS

"Super-sensitive", the tribute paid by gas engineers everywhere to EMCO Regulators. Available in the proper size and type for every application where gas pressures must be controlled.

X



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"The perfect application of a principle." The Nordstrom method of "Sealdport" lubrication has made practical the use of plug cock valves as large as 30" in size. The most satisfactory service is assured through their leak resistant, non-sticking and positive shut off construction.

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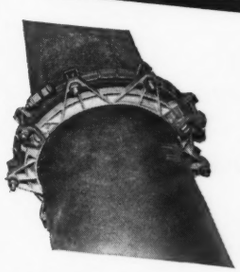


EMCO BELL JOINT CLAMPS

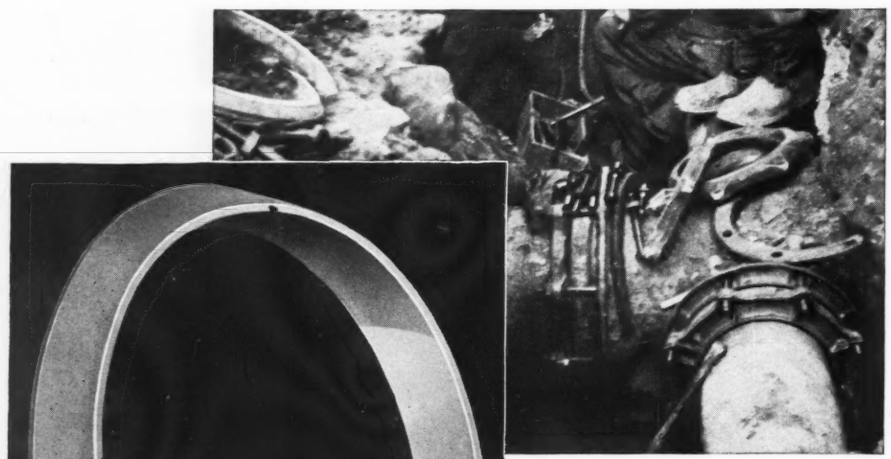
This clamp is designed specifically for one purpose—to stop leakage at the joints in existing cast iron bell and spigot pipe. The EMCO clamp is sectional in construction and may be applied to the joints without disturbing the line.

X

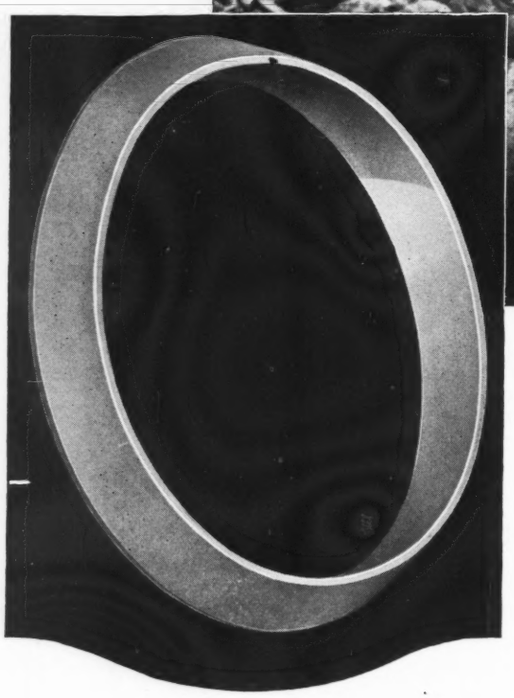
PARANITE

OVER 10,000,000 IN USE

Paranite Pipe Joint and Leak Clamp Gaskets have been steadily and conservatively developed and perfected for more than 19 years. Today, among men who build the important pipe lines, Paranite is the by-word that means *permanent satisfaction!* Their extensive use emphasizes their unusual dependability.



Left:—Leak Clamp joints "going down" with a Paranite Gasket to seal them. This is a new mixed gas line and uses our Special Paranite "A", a gasket that is unaffected by drip oil.



Paranite Gaskets are offered in two types—Paranite "C" for natural gas; Paranite "A" for manufactured and mixed gases. Both of these gaskets soon weld themselves to the coupling and pipe, and compensate within the joint for all normal expansion and contraction along the line.

Paranite is a specially compounded formula manufactured exclusively by us. Name registered in U. S. Patent Office.

TRADE PARANITE MARK

Paranite Pipe Joint Rings are distributed by Pipe Joint Manufacturers

The Manhattan Rubber Mfg. Division

of RAYBESTOS-MANHATTAN, Inc.

Executive Offices and Factories

Passaic, New Jersey

12 miles of cast iron pipe with
MECHANICAL JOINTS
for a high pressure gas line

THE above photograph was taken during the recent installation of a 12-mile section of a cross-country high-pressure natural gas transmission line.

Specifications called for 6-inch cast iron pipe with *mechanical joints*, subject to 400-pound pressure field test. The joints used are based on the "stuffing-box" principle employing rubber gaskets with follower rings.

The "stuffing-box" principle is embodied in several mechanical joints made by members of The Cast Iron Pipe Research Association. Tests and installations have demonstrated that these joints are *gas-tight* under high pressures.

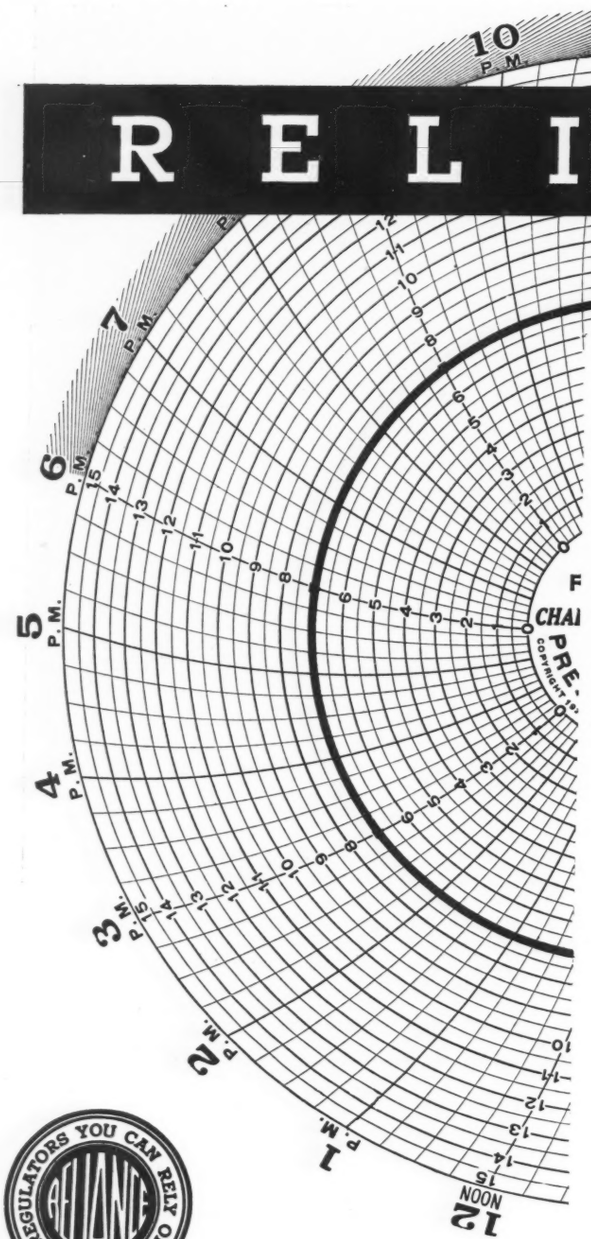
For further information write to The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 309 Peoples Gas Building, Chicago, Ill.

CAST Q IRON

Look for the "Q-check" symbol as shown above. It is the registered trademark of The Cast Iron Pipe Research Association.

CAST IRON PIPE

RELIANCE



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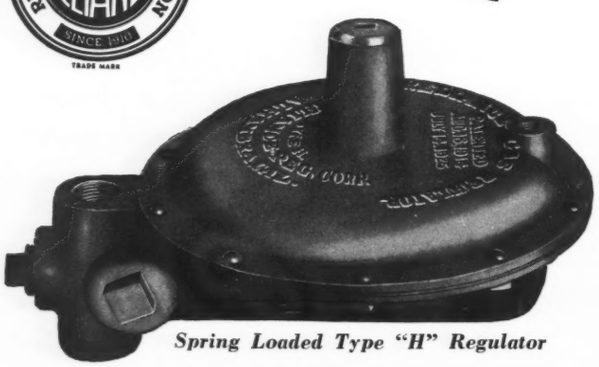

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...is Just an Old "RELIANCE" Custom!

THERE can be no better proof than the WRITTEN record on thousands of charts, that "You can Rely on Reliance Regulators" to MAINTAIN uniform pressure under all conditions . . . . month in and month out . . . . with a minimum of service costs.

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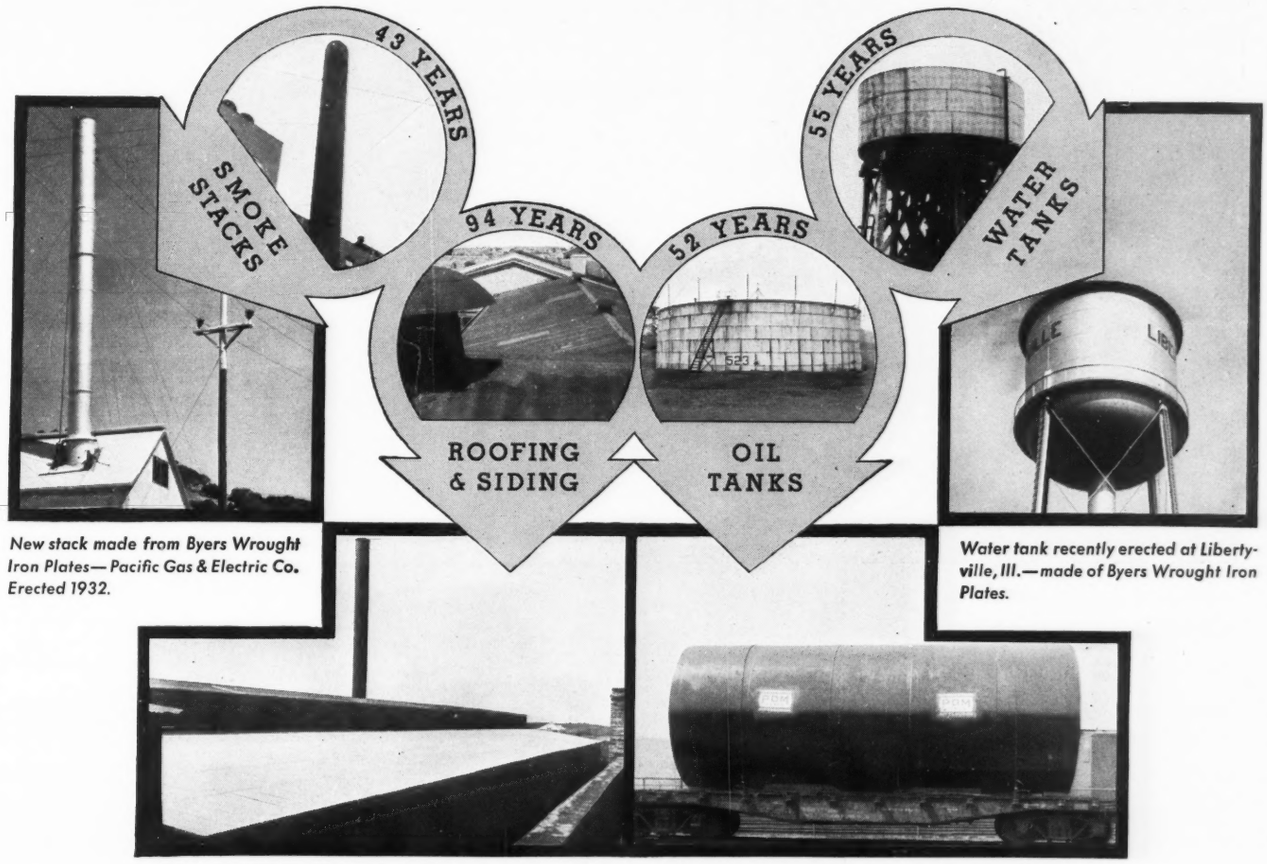
These wrought iron veterans support today's specifications



New stack made from Byers Wrought Iron Plates— Pacific Gas & Electric Co. Erected 1932.

Water tank recently erected at Libertyville, Ill.—made of Byers Wrought Iron Plates.

Byers Wrought Iron Sheets for roofing and siding—American Plate Glass Co. Erected 1932.

New oil storage tank made from Byers Wrought Iron Plates. Installed 1932.

THESE wrought iron veterans have proved through service what engineers can expect from today's wrought iron installations. The recognition for "good wrought iron" has always existed and now the material itself is again available.

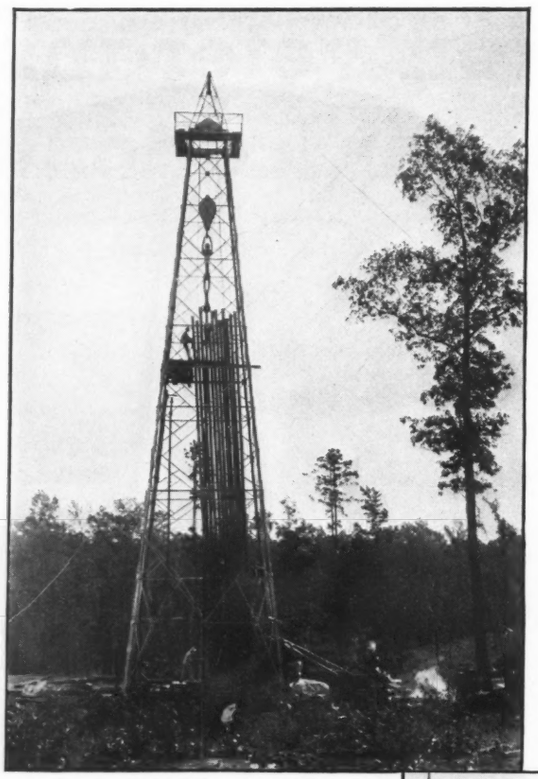
You can get "good wrought iron" today. Every fine quality which made wrought iron give such good service in these old installations is found in the plates and sheets furnished by A. M. Byers Company for the tanks, stacks and roofs illustrated in the newer installations. In addition, Byers Genuine Wrought Iron has ductility, elastic limit and tensile strength superior to that associated with the older wrought irons. These improvements lend themselves to modern fabricating methods.

Listed below are products of Byers Genuine Wrought Iron which when properly applied will lower your maintenance and replacement cost through their resistance to corrosion and fracture from vibration fatigue. Send our Engineering Service Department the prints covering your next project. An estimate of the cost and suggestions for the use of wrought iron will be given without obligation. A. M. Byers Company, Pittsburgh, Pa. Established 1864.

BYERS GENUINE WROUGHT IRON PRODUCTS

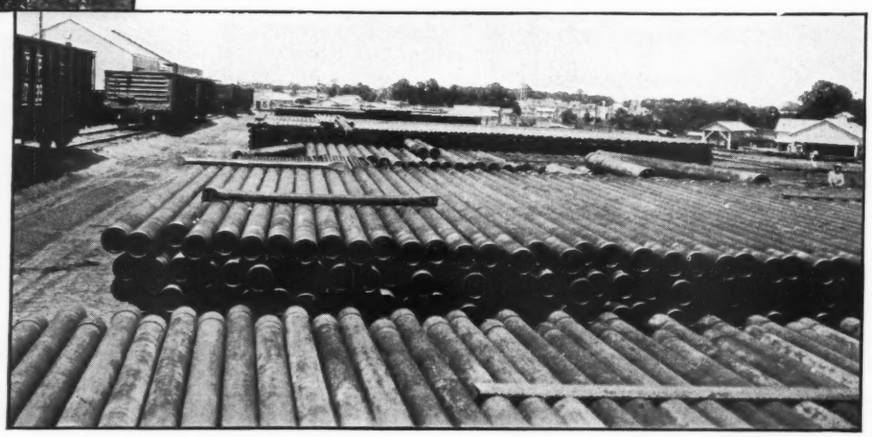
PIPE • CASING • COUPLINGS NIPPLES • WELDING FITTINGS • BLOOMS • RIVETS
SPECIAL BENDING PIPE • BAR IRON • TUBING • PLATES • SHEETS • BILLETS • STRUCTURALS

STANDARD of QUALITY for 68 YEARS • • • TODAY BETTER THAN EVER



A view of one of many wells being drilled in which "Chester" casing is being used giving satisfactory and efficient service.

View of stock of "Chester" casing carried by one of the various oil companies for future use.



Care of manufacture and material used have contributed to its success.

Chester also makes all classes of Genuine Wrought Iron Line Pipe and Copper Bearing Steel Pipe.

SOUTH CHESTER TUBE COMPANY, CHESTER, PA.

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Louisiana Iron & Supply Co., Shreveport, La., Henderson and Kilgore, Texas.

Great Northern Tool & Supply Co., Billings & Kevin, Mont., Kemmerer and Cody, Wyo.

Star Drilling Machine Company, 550 Clinton Street, Portland, Oregon and Akron, Ohio.

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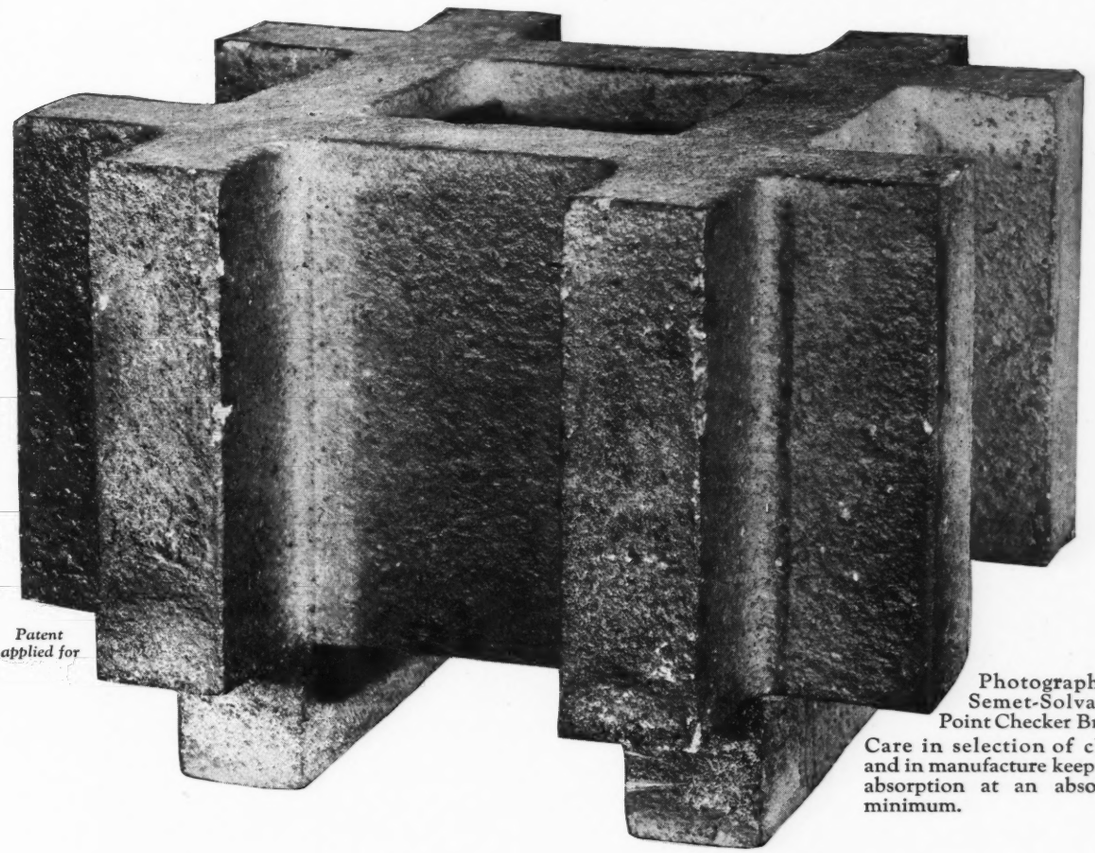
LINE PIPE



Patent applied for

Photograph of Semet-Solvay 8-Point Checker Brick. Care in selection of clays and in manufacture keeps oil absorption at an absolute minimum.

THIS IS IT—

Here are some facts about the new Semet-Solvay 8-point Checkerbrick for water gas carburetors and superheaters, that have aroused the interest of gas plant operators:

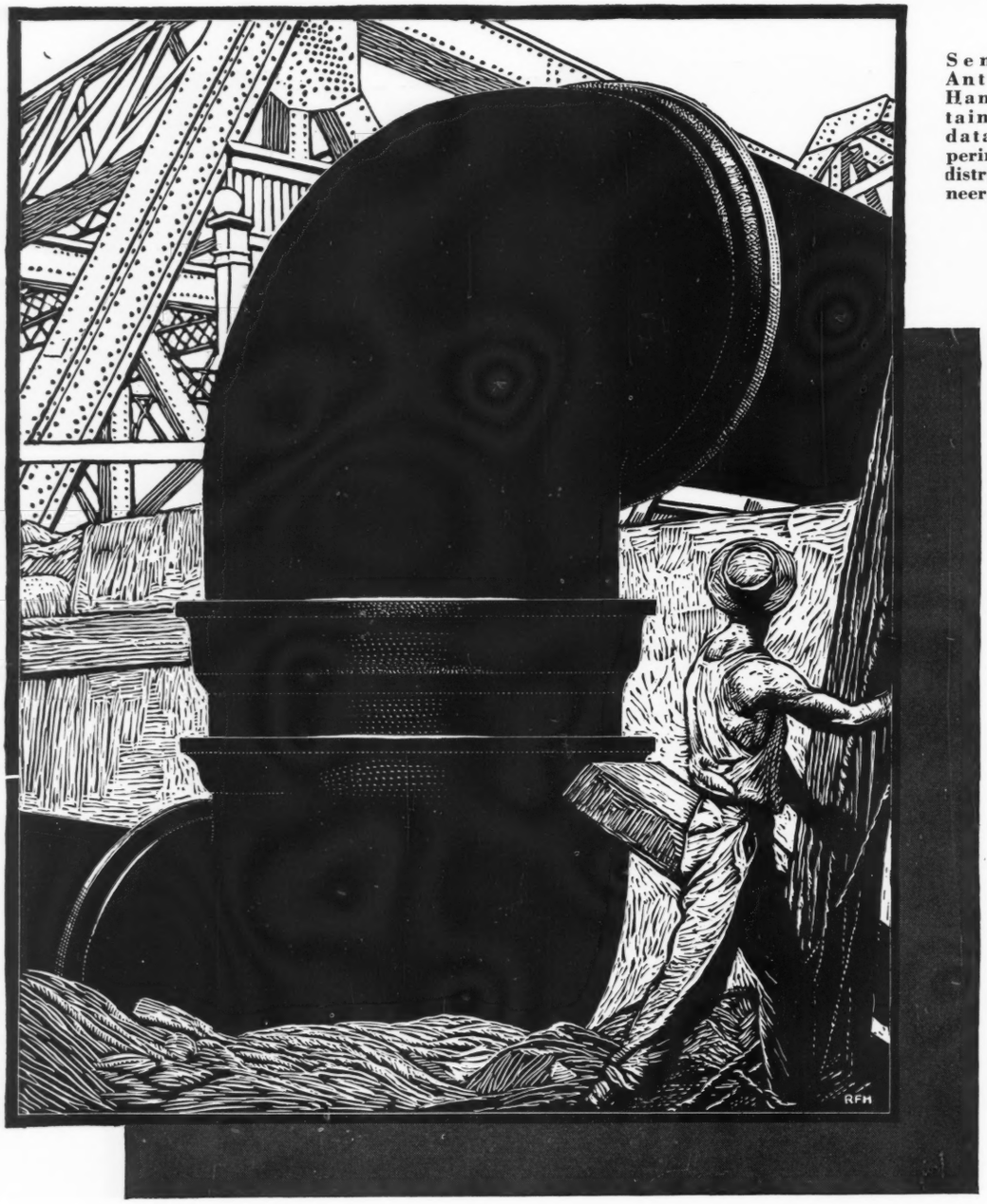
48% more exposed surface by volume; 62% more exposed surface by weight; 67½% more open flue space and time contact than can be obtained from "standard" checker brick.

	Standard Brick 9" x 4½" x 2½" with 3" spacing.	8-Point Checker 8½" sq., 6" high with 3" flue.
Exposed surface per brick	105.0 sq. in.	300.0 sq. in.
Number of bricks per sq. ft.	7.757	3.986
Exposed surface per cu. ft.	819.0 sq. in.	1,196.0 sq. in.
Flue area per sq. ft.	42.84 sq. in.	71.75 sq. in.

In the interest of higher operating efficiency and reduced holder cost of gas, we urge you to install this brick now in one or more of your machines. A trial will persuade you to adopt it as standard epuipment.

Semet-Solvay Engineering Corporation

40 Rector Street • New York, N. Y.



Send for new Anthony Joint Handbook containing valuable data for gas superintendents and distribution engineers.

Our pipe bears thistrademark of The Cast Iron Pipe Research Association.

This huge main installed by a large Gas Company is one of a number of notable gas engineering projects utilizing U. S. Cast Iron Pipe, among them the world's largest gas main installed a few years ago by Peoples Gas Light and Coke Company in Chicago. Large diameter pipe for gas and water mains, or sewer construction, promptly available at various shipping points, is a feature of this Company's service.

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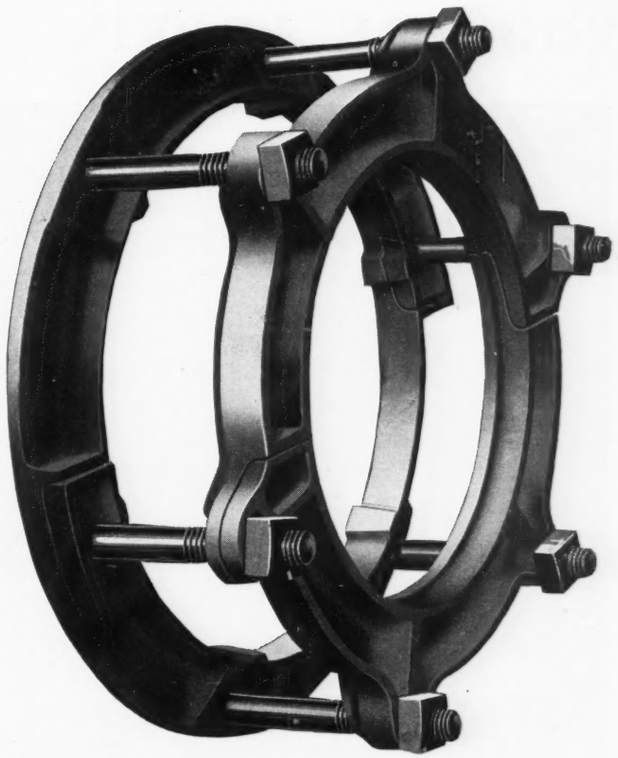
SALES OFFICES: NEW YORK, BUFFALO, CLEVELAND, CHICAGO, PHILADELPHIA, PITTSBURGH, DALLAS, BIRMINGHAM, KANSAS CITY, MINNEAPOLIS, SEATTLE, LOS ANGELES, SAN FRANCISCO

U. S. CAST IRON PIPE

Copyright 1932, United States Pipe and Foundry Co.

A *New* DAYTON BELL JOINT CLAMP



A new and improved design which provides an economical means of rapidly, easily and permanently repairing leaks in joints of water, manufactured gas, or other lines using bell and spigot pipe.

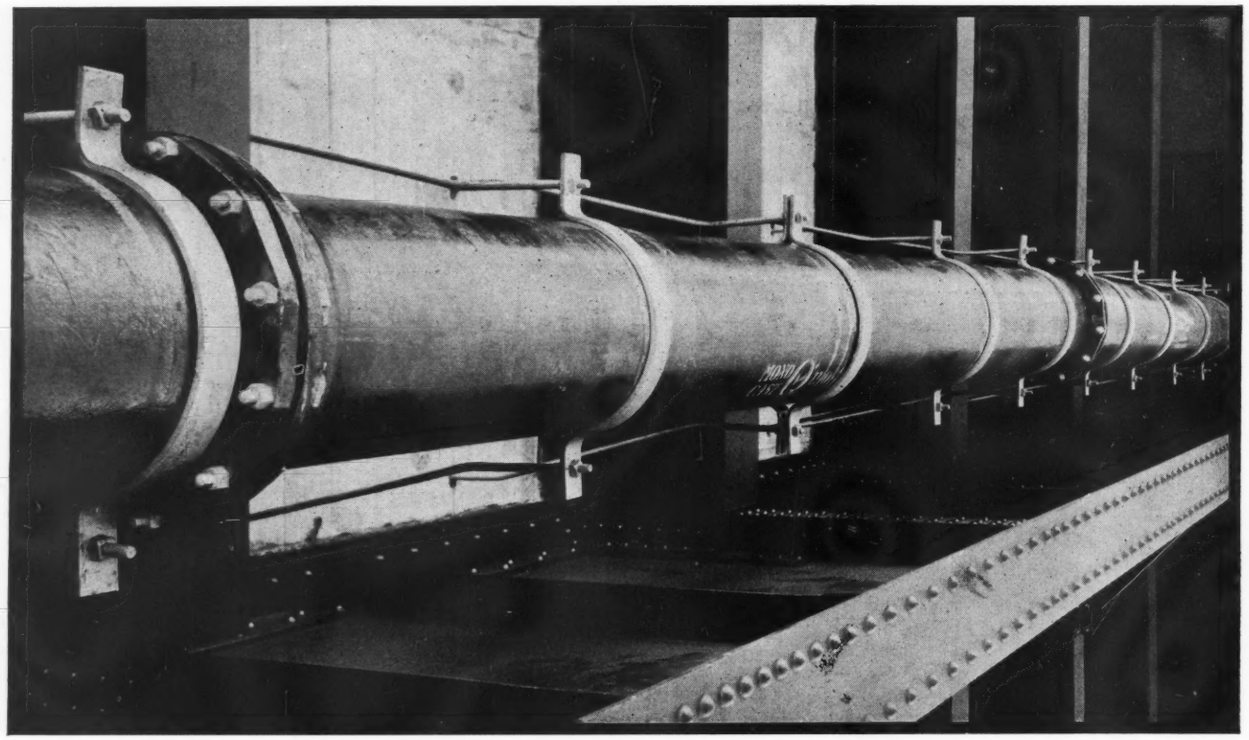
Over 25 years of manufacturing experience has been utilized in the production of this new Clamp. Its use assures a positive seal that is absolutely tight and permanently leak-proof under all conditions.

Made in all standard sizes.

THE DAYTON PIPE COUPLING CO.

DAYTON, OHIO

YOU ARE LOOKING AT A TESTIMONIAL



Closeup of 16-inch Mono-Cast Doublex Simplex Centrifugal Cast Iron Pipe strapped to the under side of a recently completed viaduct in Kansas City, Mo.

to MONO-CAST DOUBLEX SIMPLEX PIPE

THE pipe you see strapped to the under side of the viaduct in the photograph above is subjected to high operating pressure (130 lbs. per sq. in.) vibration from traffic overhead, and cross-vibrations and corrosive atmospheric conditions from locomotives passing underneath. That is about as powerful an army of pipe enemies as could be concentrated on one job. But the engineers in charge of this magnificent modern viaduct knew that Mono-Cast Doublex Simplex Centrifugal Pipe could be depended on to resist the attack of these destructive forces. Centrifugally cast in sand-lined molds, this pipe is exceptionally strong in light weights; it successfully carries pressure from 0 to 1000 pounds. Equipped with the Doublex Simplex (gland packed) Joint, it remains gas-tight and liquid-tight under vibration and deflection. Made of high-quality cast iron, it resists corrosion bare-handed. Have you full details on modern centrifugally cast pipe as made by this company? Write nearest Acipco office for complimentary copies of our catalogs.

◄ AMERICAN CAST IRON PIPE COMPANY ►

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AND

THE SOUTHERN CALIFORNIA METER ASSOCIATION

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Distribution of Bottled Gas on a Public Utility Basis . . . 36
By H. H. Henley

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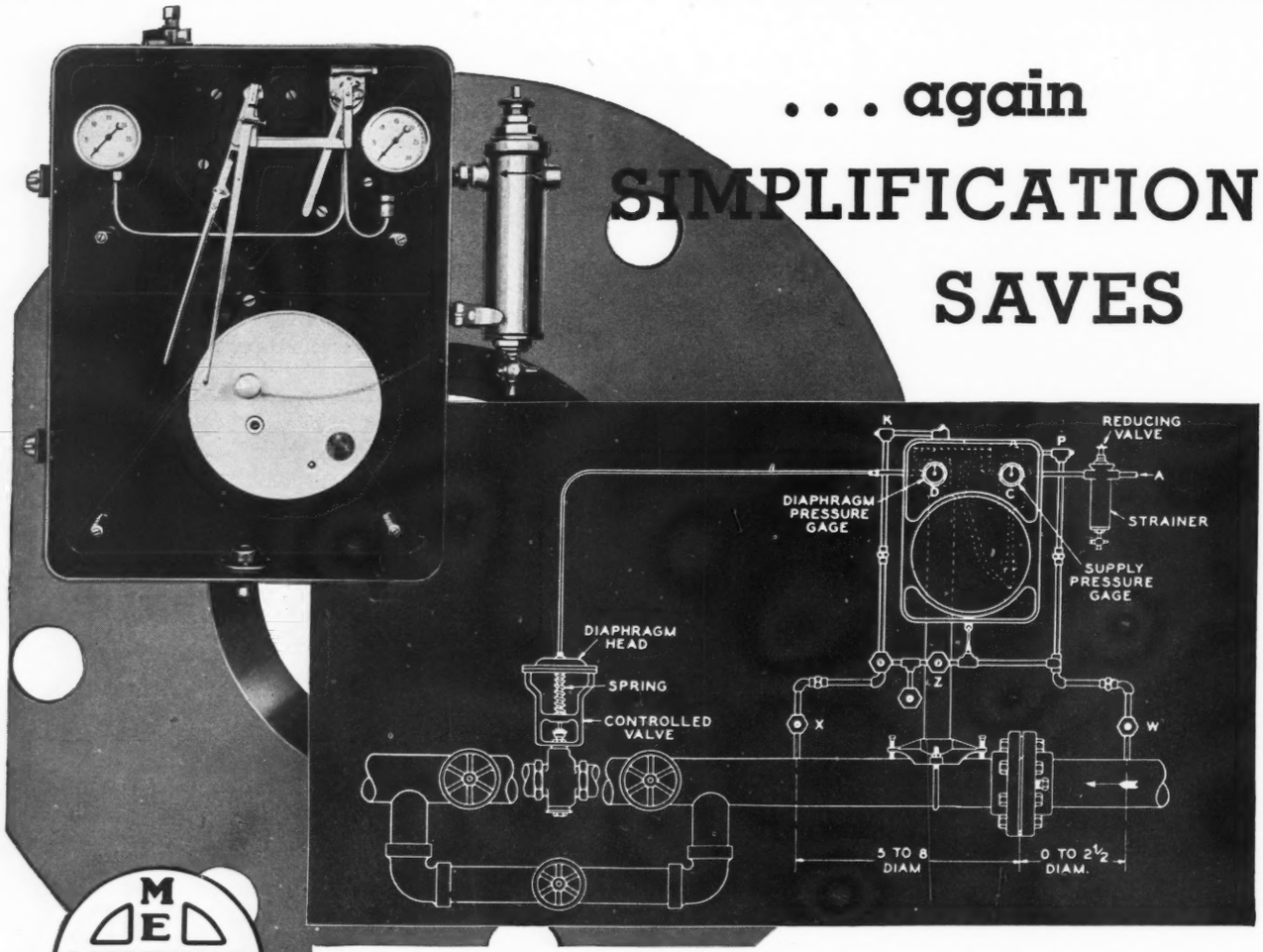

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October, 1932

WESTERN GAS

"Reg. U. S. Pat. Off."

Vol. VIII, No. 10

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

Industry Gathering *for* 14th A. G. A. Sessions—Oct. 10-12

COMPRESSING its 14th Annual Convention schedule into three days, October 10, 11 and 12, the American Gas Association headquarters and elective officers again have produced a program combination which will yield much of value to those attending the Atlantic City sessions.

This year three hotels will be used for meeting places of various general and departmental organizations. All general sessions will be held at the Traymore Hotel, as will also the Commercial and Industrial Section conferences. Meetings of the Natural Gas Department, Technical, and Publicity and Advertising Sections will be at the Ambassador Hotel. The Accounting Section will meet at Haddon Hall, where an exhibit of office equipment will also be held. This will be the only exhibit of equipment at the Convention, the customary general exposition of appliances and apparatus being dispensed with this year.

Registration will open at each of the three hotels on Monday morning, with several sectional meetings arranged for during the day. The first of three general sessions comes Monday evening, to be called to order at 8 o'clock by President R. W. Gallagher. Each of the remaining two days will be opened with general sessions.

For the general sessions a strong array of speaking talent is arranged, both from within and without the gas industry. Speakers invited to bring addresses to the convention include the following:

Dr. Theodore J. Grayson, University of Pennsylvania; Henry L. Doherty, president, H. L. Doherty & Co.; B. J. Denman, vice-president, United Light & Power Co.; John A. Fry, president, Detroit-Michigan Stove Co.; Professor John T. Madden, New York University; Ralph W. Gallagher, president, The East Ohio Gas Co.; Charles A. Munroe, president, New York Oil Co.; Clifford E. Paige, vice-president, Brooklyn Union Gas Co.; Conrad N. Lauer, president, Philadelphia Gas Works and president American Society of Mechanical Engineers; Hon. Harry Bacharach, Mayor of Atlantic City and member New Jersey Board of Utility Commissioners; Wm. J. Welch, president, New York and Richmond Gas Co.; L. B. Denning, president, Lone Star Gas Co.; H. C. Abell, president, National Power & Light Co.; Thomas N. McCarter, president, Public Service Electric & Gas Co.

Separate meetings of the convention are tentatively arranged on the following schedule, the various sections convening at the respective meeting places given above.

MONDAY, OCTOBER 10

Exhibit of Office Labor Saving Devices	10:00 a.m.
Natural Gas Department Session	2:00 p.m.
First Accounting Section Session	2:00 p.m.
Publicity and Advertising Section Session	3:00 p.m.
First General Session	8:00 p.m.
Entertainment	10:30 p.m.

TUESDAY, OCTOBER 11

Second General Session	10:00 a.m.
Second Accounting Section Session	2:00 p.m.
First Commercial Section Session	2:00 p.m.
First Industrial Gas Section Session	2:00 p.m.
First Technical Section Session	2:00 p.m.
Entertainment	8:00 p.m.

WEDNESDAY, OCTOBER 12

Third General Session	10:00 a.m.
Second Commercial Section Session	2:00 p.m.
Second Industrial Gas Section Session	2:00 p.m.
Second Technical Section Session	2:00 p.m.

Current and future activities in the industry, coming within the scope of the several sections, are covered thoroughly in the programs set up for the convention's group meetings. A glance through these sectional programs reveals such key subjects as the following, due for discussion:

Accounting Section: Customer Relations as Affected by Change to Mixed Gases—Customer Relations Training in Practice—Court and Commission Decisions Affecting Accounting and Finance—Uniform Classification of Accounts — Regulating Employment in the Offices—Accounts Payable—Distribution and Photo Strip Accounting—Meter Reading Sheets and Binders—Credit and Collection System for Small Companies.

Commercial Section: The Modern Gas Range—National Range Advertising Campaign — Dealer Cooperative Activities on the Pacific Coast—Servicing Activities—Air Conditioning—Home and Industry — Marketing Automatic Water Heaters Today—Methods and Results of Employee Sales Campaigns—Home Service as a Sales Ally—Developing Retail Refrigeration Sales.

(Continued on Page 31)

R. W. Gallagher
1932 President
A.G.A.

Arthur Hewitt
Nominee for
Presidency, 1933

Alexander Forward
Managing Director
A.G.A.

Adhesive Characteristics *of* Pipe-Coating Bitumens

Notes on Apparatus for Testing Adhesiveness Involving the Use of the Smith Ductilometer

By H. S. CHRISTOPHER

Bureau of Standards
*United States Department of Commerce**

I. Introduction

CONSIDERATIONS respecting pipe-coating bitumens which are set forth in ensuing paragraphs are founded on experience at the Bureau of Standards with the very considerable number of specimens of primary and secondary coating materials involved in the American Petroleum Institute and American Gas Association coating research projects. The studies have shown conclusively that some degree of standardization, particularly of primers, is needed, and since the question of adhesion or adhesiveness is certain to engage attention when the task of standardization is undertaken, a consideration of this property is offered as the principal subject matter of this paper.

H. S. Christopher

In the absence of special facilities for direct application, it is apparent that most of the bitumens which are available at the present time as pipe coatings can only be fixed on the surface of the metal through the intermediate aid of priming coats, which are observed to possess exceedingly variable characteristics as regards drying time, ability to hold the overlying coat, bonding power, and qualities of strength. These differences give rise to the varying degrees of "adhesion" of bitumen to metal which affect serviceability of the coating in the manner familiar to users of protective coatings in the field.

The term adhesion as associated with the capacity of bitumens to bond to metal has been used in the past with a rather loose regard for scientific accuracy. As defined in physics, adhesion is the molecular attraction exerted between the surfaces of bodies in contact. In accordance with this definition adhesion between a bitumen and a metal surface or any other surface is the force applied normal to, and in a direction away from, the surface, needed to effect a perfectly clean separation of bitumen from a unit area of that surface. It is presumed, of course, that no deformation of the bitumen occurs during this process of separation; in other words, that the bitumen behaves as a rigid body attached to the metal. Common experience indicates that bitumens do not separate from metal in a clean-cut manner but tend to leave residual traces of primer or secondary bitumen. The separation at the bitumen-metal interface may be virtually a plane, but presence of the residual bitumen on the metal indicates that rupture has occurred in either the primary or secondary coating, the measurement being actually one of tensile strength of bitumen rather than of adhesion. For the purposes of bitumen technology, adhesiveness is possibly a better, though less scientific term for use in this connection.

Because of the above cited variation in the adhesive properties of the various available bitumens this subject is of particular importance to the pipe-coating user. Imperfect bonding of the secondary coating is not infrequently responsible for moisture-pockets, and indirectly for deformation and removal of the coating.

II. Factors Influencing Adhesiveness

Owing to the diverse conditions in practice under which pipes and other metal structures must be coated, it is clear that the special facilities needed in the technique of bonding secondary bitumens direct to the surfaces cannot conveniently be made available. It is generally appreciated, however, that better results in the application of these bitumens can usually be obtained by heating the metal beforehand to a temperature somewhat in excess of that at which the secondary bitumen is to be applied. Such procedure, which obviates the need for a primer, avoids the chilling of hot bitumen brought in contact with cold surfaces which tends to cause inclusions of air and moisture at the interface. A familiar example of tenacity of bond between bitumen and metal heated in contact with it is found in the case of asphalt and coal-tar pitch heating tanks and dippers used in the field application of these materials.

Since the magnitude of the force of adhesion between bitumen and metal, where the bond between the two has been effected by preliminary heating of the latter, will usually be found greatly to exceed the cohesive strength of the bitumen, the question of adhesion assumes an important aspect only where priming coats are involved.

Adhesion between secondary bitumen and metal which is secured through the medium of a prime coat is difficult of explanation as to mechanism. In some cases the primary coat appears to act like a glue to hold the outer coat, while in others the primer loses itself wholly or partly through solution in the secondary coat. Primers which are thick and heavy act in the first described manner while the thin cut-backs exhibit tendencies of the latter character.

Other things being equal, better bonding powers may be expected in thin-bodied primers than in primers of thick-bodied makeup, for the obvious reason that thin materials can be more easily worked into the metal surface by brushing, which is the usual and most effective means of application. Intimacy of contact between metal and bitumen measures the degree of adhesion, as with any other bodies in contact. Secondary

* Paper before the Pacific Coast Conference on Soil Corrosion, held at Los Angeles, Calif., June 14, 1932. Publication approved by the acting director of the Bureau of Standards, United States Department of Commerce.

TABLE NO. 1. PHYSICAL, MECHANICAL, THERMAL PROVISIONS OF SOME PIPE COATING MATERIALS.
(Arranged in the order of their ball and ring softening points).

Identification mark of manufacturer	Type of Coating	Sp. Gr.	Softening point (B&R) °F	Penetration (Dow) 0 gm - 5 sec. 115°F	Ductility (Dow) cms 115°F	Consistometer Hardness (Abraham) 77°F	Consistometer Hardness (Abraham) 115°F	Insoluble in CS_2 %	Ash %	Free Carbon %	Adhesiveness (B. of S. apparatus) lb/in² 77°F	Type of separation	Remarks
A	Asphalt (Californian)	1.020	62	38(2)	7.2	15.3	-	1.0	0.5	0.5	27.9	D	Very heavy - quick drying primer
B	Asphalt(Mid-continent)	0.988	93	25(2)	2.6	23.0	-	0.8	0.2	0.6	54.2	D	Very heavy - quick drying primer
C	Coal tar product	1.289	116	6(1)	2.2	70.7	-	41.9	11.1	30.8	66.2	B	Quick drying primer - medium body
D(1)	Filled asphalt blend	1.419	145	74	60.0	51.9	-	38.8	23.6	15.2	120.0	B	Thin, cut-back type primer
D(2)	Filled asphalt blend	1.420	158	25	58.2	71.1	10.0	39.3	21.4	17.9	87.3	B	Thin, cut-back type primer
E	Filled asphalt (Eastern)	1.186	182	18	39.6	-	17.1	41.7	39.1	2.6	-	-	
F(1)	Enamel (coal tar)	1.624	187	-	10.7	-	38.0	53.5	36.1	17.4	39.7	A	Quick drying primer, thin body
G	Enamel (coal tar)	1.360	190	7	3.6	-	56.5	32.7	13.2	19.5	183.2	B	
H	Enamel, (coal tar)	1.266	192	16	16.0	-	23.5	42.1	22.2	19.9	46.3	C	Very slow drying primer-thin body
I	Asphalt mixture (Western)	1.004	194	22	-	42.5	17.1	1.9	1.1	0.8	49.6	B	Thin, quick drying primer
J	Enamel (coal tar)	1.414	204	2	0.0	-	68.4	42.8	25.8	17.0	88.0	B	Thin, quick drying primer
F(2)	Enamel (coal tar)	1.610	205	2	3.8	-	61.3	55.3	35.3	20.0	268.0	A	Quick drying primer, thin body

(1) 150 grams - 5 seconds - 77°F
(2) 50 grams - 5 seconds - 77°F

bitumens are as variable in their characteristics as are priming materials. Physical and chemical differences such as are indicated by the test data recorded in Table No. 1 for the coal-tar pitches, blended and unblended bitumens, pyrogenous asphalts and bituminous enamels which are used as coatings for pipe underground, clearly account for the inequalities in stability and serviceability that are matters of common observation.

III. Laboratory Tests of Bitumens

1. Conventional physical, mechanical, and thermal tests: At the present time there are but few tests applicable to pipe-coating bitumens that afford more than a bare indication of their probable worth in service. For purposes of identification and quality control the usual laboratory tests of softening point, ductility, penetration, consistency and solubility serve advantageously to supplement more direct tests such as bonding strength and resistance to shock and deformation. These conventional tests do not in any case supplant the others, however.

2. Prior development in adhesiveness tests: In considering various aspects of the adhesion test, it is desirable to have a view of some of the background which has already been developed. The idea of testing the bonding strength of bituminous substances to metallic surfaces is not new. "Adhesion" experiments involving the use of more or less cumbersome equipment have been made by several individuals and the results of their work described in a number of reports and papers (1, 2, 3, 4, 5)*

* References will be found on Pg. 42.

Most users of bituminous materials are more or less familiar with the Osborne "Adhesive tester" and the Brown "Adhesive-meter." These instruments and their mode of use are described in the book "Asphalts and Allied Substances," by Herbert Abraham. The Osborne apparatus is designed particularly to measure the adhesion of metal to semi-liquid semi-solid road oils. The Brown instrument is designed for the measurement of stickiness or cohesive strength of road oils. Although adaptable to testing some varieties of pipe coating bitumens, neither of these tests gives direct results for adhesion or adhesiveness.

A beginning was made in the design of a direct adhesiveness test by the A. O. Smith Corp., Milwaukee (1). The apparatus there developed involved the use of a hydraulic press to force apart plates between which (and to which) the material under examination was molded. It was discovered that the rate of application of force to the specimen had much to do with the magnitude of the load at rupture. Further experiments were made by C. F. Turner (3) of the East Ohio Gas Co. in Cleveland, with hydraulic apparatus somewhat similar to A. O. Smith's but embodying refinements in means for securing uniformly graduated increase of pressure, thus permitting more accurate measurement.

3. Limitations to existing adhesiveness tests: Conclusions reached by the East Ohio Gas Co. with its apparatus were as follows:

1. Values secured are not necessarily a measure of the bond which might exist between bitumen and a curved pipe surface.

2. Surfaces of the test plates must be as nearly uniform in quality as it is possible to make them.

3. All tests must be conducted at a fixed temperature, since ductility of the bitumen changes with temperature.

4. Rate of increase of load on the test specimen must be uniform and the load must be evenly distributed over all points on the surface.

It was pointed out by A. W. Simpson (2) that several factors including cohesion of the bitumen and the adhesion of one surface with another, or of several surfaces one with another are involved in the results.

With a number of unknown quantities included in the values from which derivation of the adhesive force is desired, it becomes necessary either to evaluate these quantities or to eliminate them altogether. In some cases it appears possible to do the latter. Bituminous pipe coating enamels afford an example of a class of material having no appreciable ductility at temperatures around 77°F., (one of the fixed temperatures of bitumenology, and one which may be regarded as ordinary room temperature.)

These materials have a "brittle point" or point of zero ductility well above 77°F., and consequently lend themselves readily to rupture tests with apparatus of the A. O. Smith type. Values approximating the true force of bond of bitumen to metal may be obtained without complication from ductility. The inherent cohesive force of the material must, of course, be greater than the

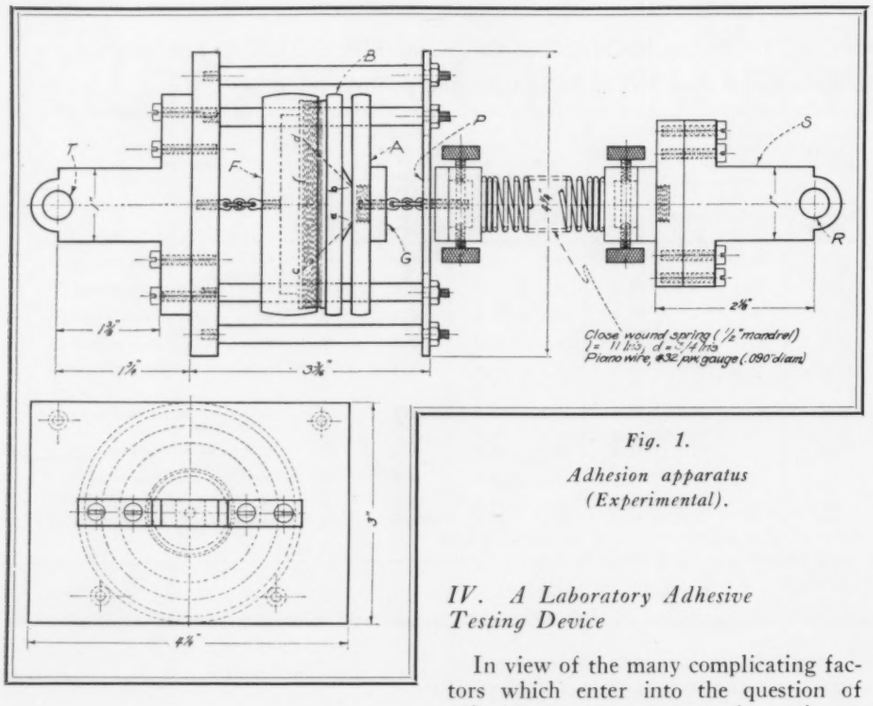


Fig. 1.

Adhesion apparatus (Experimental).

adhesive force of the bitumen to the metal. Otherwise there will not be a clean separation of the two but rather a break in the bitumen itself.

Pipe-coating materials of relatively high penetration at ordinary temperatures comprise a class that is in another category. Air and steam blown petroleum asphalts and some coal-tar pitches containing smaller amounts of "filler" are in this class. Brittle points among such substances are usually far below 77°F., and ductilities run in the range indicated for the samples A, B, E, and I in Table No. 1 which lists some physical and mechanical properties of a number of bituminous pipe coating materials now on the market.

It is possible, of course, to lower the temperature of such a material by use of some freezing agent until the point of zero ductility is reached, but practical objections to doing so stand in the way. It is not possible at present to determine the temperature of zero ductility of a bitumen without making an actual "brittle-point" test (6) or else by extrapolating to the zero point on a curve of change in ductility with temperature. The chief objection to attempting an adhesion test at the temperature of zero ductility, however, lies in the undesirability of departing too widely from ordinary temperatures under which the coating would be used in practice. Brittle points of a considerable number of pipe coating materials lie under zero degrees C., and an adhesion measurement at such a temperature may be an unreliable index of values at higher temperatures.

IV. A Laboratory Adhesive Testing Device

In view of the many complicating factors which enter into the question of adhesiveness measurements in so far as bitumen-metal combinations are concerned, the problem of devising an accurate and direct test may be looked upon as being a very difficult if not a hopeless one. There is a recognized need, however, for some sort of adhesiveness test that will be adaptable to use in setting up specifications for priming materials, and in recognition of this need efforts have been made at the Bureau of Standards to devise a laboratory apparatus for measuring adhesiveness involving relatively simple components.

The apparatus about to be described was made at the Bureau and has given some promise of finding a field of use. It is comparable to the other types of adhesion testers principally in respect to the method of application of force, namely by a uniformly graduated increase. Fig. 1, a full-scale working sketch of the apparatus, and Fig. 2, a photograph of it set up with the auxiliary equipment, indicate the nature of the construction and manner of use.

The 3-inch disc shown in Fig. 1 and marked with the letter A is prepared for reception of priming coat by first removing scale, rust, dirt and organic matter by scouring with emery paper, of grain not coarser than 120-150. The surface is then wiped with clean cheese cloth and flushed over with C. P. benzol. Without touching the surface with the hands, the disc is placed for a period of one hour in a drying oven maintained at 100°C. Following this drying operation the disc is placed in a dessicator to cool and when it has reached room temperature it is ready to receive the coat of primer. In the preparation of the disc surface the fact that traces of moisture and oil appreciably affect the magnitude of rupture load is to be borne in mind and every precaution taken to prevent presence of any traces of either of these between primer coat and metal surface. The disc is coated with the priming material supplied for the particular bitumen to be tested and is then allowed to stand in air until the primer is dry—evidenced by the disappearance of every trace of tackiness. The primed plate is then set down flat with coated face uppermost, and the brass mold B placed upon it concentrically. The secondary bitumen which has been melted with constant stirring in a 4-ounce metal container on a hot plate until its temperature has reached the value which the manufacturer specifies for proper application is then

(Continued on Page 42)

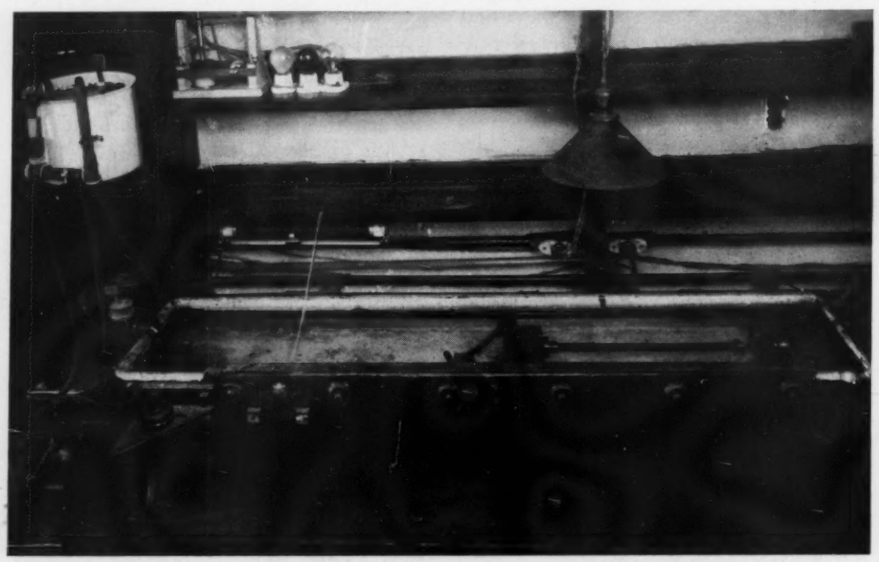


Fig. 2. Adhesive meter mounted in Smith ductility machine.

FLUES *for* Gas Appliances

By FRANK WILLS

Production Engineer
Pacific Gas and Electric Company

¶ *A discussion supplementing a paper by Mr. Wills on the same subject, appearing in "Western Gas" for August, 1932, page 56. Reference is made below to numerous tables and formulae published in the earlier discussion.—Editor.*

Table No. 1. Number of "Parallel" Horizontal Runs of Various Sizes that May be Substituted for the Single Run Whose Diameter is Equal to that of the Flue.

Diameter of Horizontal Runs	Size of Flue						
	3	4	5	6	8	10	12
	Number of "Parallel" Runs That May be Substituted.						
3	1	2	3	5	9	12	22
4		1	2	3	5	7	11
5			1	2	3	4	7
6				1	2	3	4
8					1	2	3

Example: Instead of a 10-inch run, there must be substituted 2 eights, or one eight and two sixes, or another group that may be substituted for one eight.

Square and Rectangular Flues:

A square flue, having a side equal in length to the diameter of a round flue. has 27.5 per cent greater capacity than the circular flue.

A rectangular flue, having its maximum width equal to the diameter of a round flue, has a capacity equal to

$$\left[\frac{1.8}{r\sqrt{r+1}}\right]$$

times that of the round flue, where r is the ratio of the long to the short dimension. When r = 1.21 the rectangular flue has the same capacity as the round flue.

A rectangular flue should have its greater dimension no more than twice its lesser dimension. At this limit, the rectangular flue has three times the capacity of a circular flue whose diameter is equal to the lesser dimension of the rectangular flue.

SINCE the publication of the report "Flues and Chimneys for Gas Burning Equipment" in *Western Gas,* August, 1932, a few rather important queries have been presented. These questions have been quite helpful and the writer feels that a discussion of them may serve to arouse more interest, and may attract thought to the flue problem to the end that something may be done about it. The report, as presented, provides only a preliminary basis upon which observations may be made and to which corrections can be conveniently applied as additional data are obtained, particularly those data concerning draft hood dilution and improved control of excess air during combustion.

Frank Wills

Relative Capacities of Square, Rectangular and Round Flues

The statement in regard to the relative capacities of square, rectangular, and round flues has been questioned because it does not appear to be in accord with the generally accepted statements in authoritative works. The actual difference, however, is only in the form and terms of the statements. The basis and purpose of the several statements that may be found vary greatly and often seem contradictory but upon close analysis are found to be confirmatory.

The capacities of flues of various shapes may be compared upon two different bases, i.e., for flues having certain linear dimensions of equal length or for flues of equal areas. The effect of the shape upon flow within the conduit may be expressed in terms of relative capacity or comparative resistance. Naturally, with such a situation, statements of comparisons will be made in many forms and some may appear contradictory until translated into like terms and stated upon the same basis.

The essential influence which any flue or conduit has upon flow is resistance; consequently, the most direct comparison is obtained by using their comparative resistances. For practical purposes, utility is uppermost in mind and the comparison may be made upon the basis of capacity. The purpose at hand governs the choice of terms and the basis of expression. With gas appliances, particularly domestic appliances, the fitting of square or rectangular flues into walls involves the consideration of capacity in relation to one linear dimension (least side) of the flue. When such is not the case the round flue is ordinarily used. It is therefore quite natural, for our purpose that the capacities of square and round flues be compared on the basis that the square flue has a side equal to the diameter of the round flue.

The following references from various authorities illustrate the difference in terms and basis, and yet, all of them when translated give the same result as that used in the report and repeated in the accompanying revised Table No. 1.

1. Walker, Lewis and McAdams in "Principles of Chemical Engineering," 1927, page 89: "Practically no data is available for the friction factor for sections other than circular, hence it is suggested that the hydraulic radius for the sections in question be figured and multiplied by 4, giving the equivalent diameter of a circular pipe having the same hydraulic radius."

This statement leads to the selection of an equivalent diameter for a square section such as will give equal frictional losses for equal lengths and equal velocities resulting in capacities proportional to the cross sectional areas.

2. Badger and McCabe in "Elements of Chemical Engineering," 1931, page 41: "For sections other than circular use an equivalent diameter defined as:

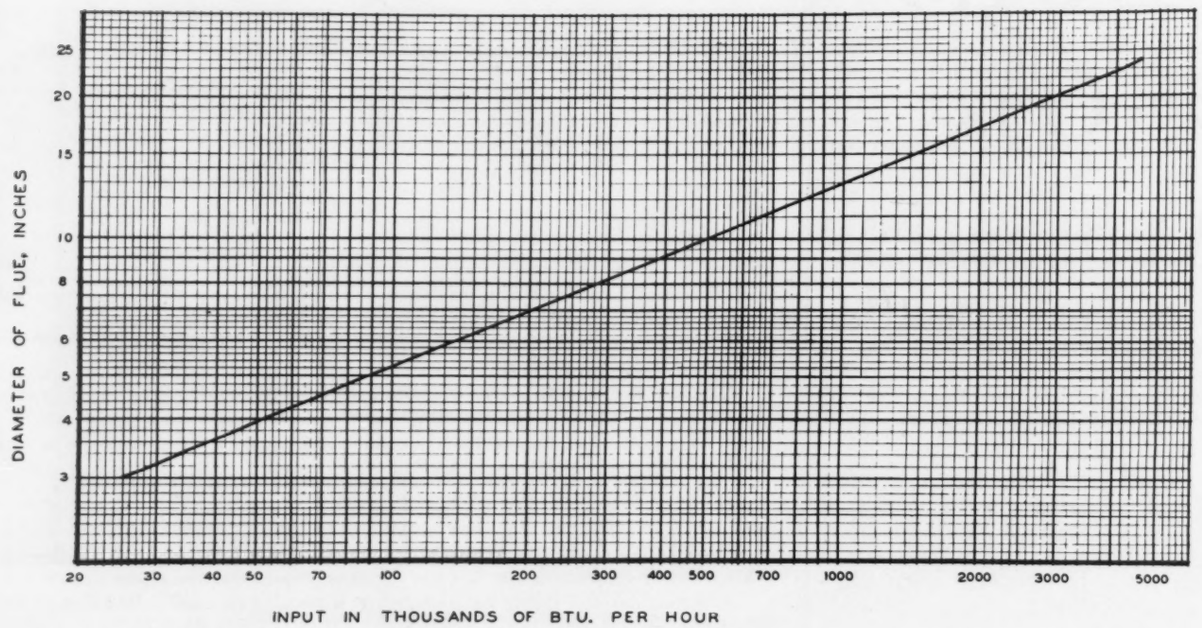
$$4x\frac{\text{Cross section area of channel}}{\text{Wetted perimeter of channel}}$$

This expression is four times the hydraulic radius and is equivalent to the statement by Walker, Lewis and McAdams.

3. Gebhardt in "Steam Power Plant Engineering", 5th Edition, 1922, page 289: "A common allowance for friction drop in flues, round or square, is 0.1 inch of water per 100 feet of straight conduit."

FIG. 1. DIAMETER OF FLUES VS. B. T. U. INPUT

For use in procedure recommended for choosing sizes of flues for gas appliances in apartment buildings where horizontal runs may be neglected.



It is evident that the author is speaking of a square flue having a side equal to the diameter of the round flue, in which case he corroborates the previous statements.

4. "Heating and Ventilating Guide", 7th Edition, 1929, page 423: "The following equations are given for resistances of conduits when carrying air at 70°F. and 29.92 inches of mercury.

"For Round Pipes

$$H = f\frac{L}{d}h$$

"For Rectangular Ducts

$$H = f\,L\frac{(a+b)}{2\,a\,b} - h$$

Where

H = loss in head, inches of water
h = inches of water per velocity head
L = length, feet
d = diameter, feet
a and b = sides of rectangular conduit, feet
f = coefficient in friction 0.01 to 0.03

When substituting values in these equations they may be brought to check the previous statements.

5. C. R. Weymouth, "A.S.M.E. Transactions"—vol. 34 (1912), page 648: "Compared with circular flues the resistance of those of rectangular section is greater at the same velocity by reason of the increased wetted area, being approximately 12 per cent greater for flues of square section and 15 per cent greater for flues of 1 × 1½ rectangular section than for flues of circular section."

This is a comparison of the three shapes for a given job (capacity) and the same velocity and therefore, of equal areas. When translated to the same basis and terms, this statement checks those previously given and all agree with those given in the report.

Table No. 1 has been revised to correct an error in its original calculation and to give additional statements on square and rectangular flues that their meaning may be clearer.

Relation of Flue Capacity of Temperature

Certain standard temperatures were selected (150° F. for domestic and 250° F. for industrial installations) for calculation of the capacities in Tables No. 2 and 3. Naturally, these are arbitrary temperatures and they were chosen with the thought of using a rather low figure in order to be conservative in recommending capacities. It is not to be expected that the actual temperatures in many cases will even approximate these temperatures but it is not contemplated that many will be less. As a supplement for those who wish to figure their capacities quite closely when the actual average stack gas temperatures are known, an additional table has been prepared. Contrary to expectations, high temperatures do not necessarily mean increased stack capacities. The maximum correction that need be applied to the values in Table No. 3, for industrial uses at any temperature higher than 250° F., is only 13 per cent, which gives that table a wide range of application.

From equation (15), it can be seen that the capacity of a flue varies with the temperature according to the value of the expression:

$$\frac{\sqrt{\frac{T_2}{T_1} - 1}}{T_2} \text{ (considering S = 1)}$$

With $T_1 = 520°$ F. (60° + 460°), values of this expression for several temperatures have been calculated and, from these, Table No. 4 has been set up showing the relative capacities referred to that at the assumed temperatures in Tables No. 2 and No. 3. Thus, capacities at other than the assumed temperatures may be derived by multiplying by the tabulated factor.

TABLE NO. 4

Aver. Flue Gas Temp. °F	Relative Capacities Basis T_2=610° (Table No.2)	Basis T_2=710° (Table No. 3)
100	.71	.57
150	1.00	.80
200	1.17	.93
250	1.25	1.00
300	1.31	1.04
350	1.36	1.08
400	1.38	1.10
450	1.39	1.11
500	1.40	1.12
600	1.41	1.13
700	1.40	1.12
800	1.39	1.11
900	1.37	1.10
1000	1.35	1.08

Note that the effect of temperature reaches a maximum at about 600°F.

(Continued on Page 44)

There's *News* in the Clock-Controlled Range

And Some Companies Are Making the Most of It

By JOHN S. SPAULDING

Joint Natural Gas Advertising Committees of Southern California

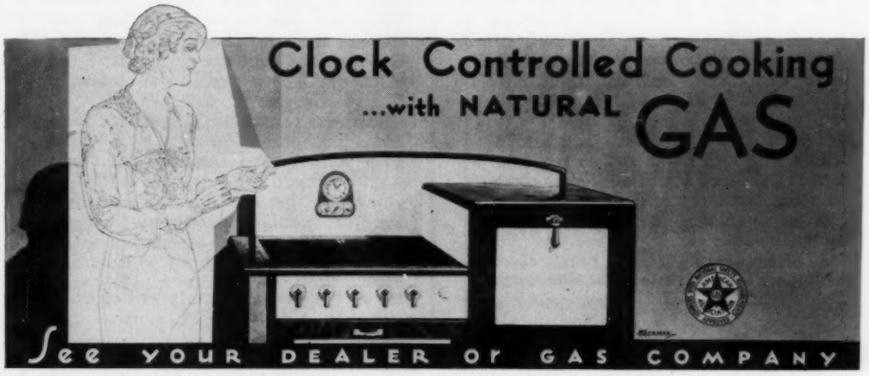
TO THE gas industry, the announcement of a perfected clock-controlled gas range was news. Early in the present year several of the gas utilities undertook extended tests of these latest automatic arrivals in the cooking field and pronounced them dependable, efficient and worth talking about.

The time-controlled valve operating both the oven and top burners proved itself foolproof against failure of any sort. Here, indeed, was the event that answered the question of many people interested in gas cooking.

Its introduction to the consumer market presented new problems, because the initial promotion of most new articles of merchandise is not ordinarily profitable, particularly in the higher price levels. Clock-control gas ranges are necessarily in the higher priced group of appliances, because, in general, the ranges carrying the control already represented the best in construction, the maximum in convenience, and the finest in style.

Retail outlets, particularly department stores, are committed to a policy of 24 to 48-hour returns on advertising space. Introductory promotion of such an all-purpose appliance undertaken by department stores could only be construed, comparatively at least, as a long term investment. All retailers shooting to a day-by-day volume bogey would find such introductory promotion relatively costly.

The three gas utilities operating in the Southern California territory, which had already devoted 18 months of unbroken advertising promotion to modern gas appliances, seized this opportunity to tell the news. For a period of nine weeks beginning August 1, the largest metropolitan papers carried quarter-page ads, each devoted to a single appeal for clock-controlled gas ranges. They compromised initially the announcement of their availability and what they were designed to do. This appeal was followed by others such as leisure, baking success that can be repeated, simplicity of operation, meal-time assistance, pride-of-ownership, social advantage, beauty of style.



Billboards, counter cards and bill stickers carried the above design.

Don't Divide Afternoons with Your Kitchen! –
.... Have a NEW CLOCK-CONTROLLED GAS RANGE
KNOW THE JOY OF better meals and yet have afternoons free from cooking cares. A new automatic clock-controlled natural gas range in your kitchen puts both of these within easy reach.
Uniform baking success was achieved with the adoption of oven heat control. Now, the other factor–Time –has been automatically controlled in the new perfected clock-operated natural gas range. Top burners and oven are controlled by the clock which automatically starts the cooking and finishes it without molesting the plot of your "Book-of-the-Month."
Of course, natural gas cooking is more economical. It costs as little as one-fifth of a cent a person a meal.
Investigate this new clock-controlled natural gas range by visiting your gas appliance dealer or gas company. Look for the Blue Star Seal of the American Gas Association Testing Laboratory.
LOS ANGELES GAS and ELECTRIC CORPORATION
SOUTHERN COUNTIES GAS COMPANY
SOUTHERN CALIFORNIA GAS COMPANY
ASK YOUR GAS APPLIANCE DEALER OR GAS COMPANY

One message in Southern California's three-company newspaper advertising appeal.

During the first two weeks of September the gas appliance dealers, department stores and utilities cooperated in advertising a 10 per cent introductory offer in addition to the usual 10 per cent for trade-in on old ranges. This merchandising theme accounted for many satisfactory sales of this all-automatic gas range.

Over 400 outdoor bulletins carried a simple poster showing the new clock-equipped gas range under an announcement head, together with a stylish housewife in the act of deserting her home for an afternoon of leisure.

Reproductions of this poster were made for dealers on small counter cards. Nearly 750,000 stamps in color carried the same design in miniature. These stamps were distributed through the mail by the three gas utilities at billing time.

Three locally published magazines carried further news of the new clock-controlled gas range.

The basic promotion of the automatic time-clock range by the three gas companies jointly was further reinforced by the individual advertising of the two gas companies having retail outlets.

Oklahoma Natural's *Human* Relations Program

By GEORGE GOODALE

Oklahoma Natural Gas Corporation
Tulsa, Oklahoma

"THE public is fair, when it knows the facts."

This quotation from the masthead of the Oklahoma Natural Gas Corp. magazine is the keynote of the organization's program of public relations—or, perhaps much better,—human relations—for, in the final analysis, understanding comes from the human quality of the relationship between customer and company.

George Goodale

Arrival at this basis of human understanding with its customers, in the case of the Oklahoma Natural, is sought to be accomplished through constructive acts and sound information that will aid 600,000 friends and consumers in reaching the conclusion that the company which serves them with natural gas is an outstanding public servant, honest, sincere and friendly.

The ground work for the present program was laid with an intensive study on the part of some 600 members of the organization of the American Gas Association's course in "Employee-Customer Relations." Facts regarding the Oklahoma Natural's operations were brought out in the discussions, so that, when they had completed the course, students were not only thinking constantly of impressions they as individuals were leaving with customers, but also were equipped with information to be passed on to those with whom they came in contact.

Executive Conferences

Under the leadership of President E. A. Olsen there was inaugurated in 1931 the plan of holding meetings of managers, superintendents and department heads in Tulsa twice a month for the discussion of problems affecting the operations and relations of the company. These meetings are supplemented with reports and bulletins showing not only the progress made by the various districts in their operations, but also giving information regarding taxes paid in the various communities, the cost per day of gas purchased by the average consumer and other pertinent information interesting alike to customer and employee.

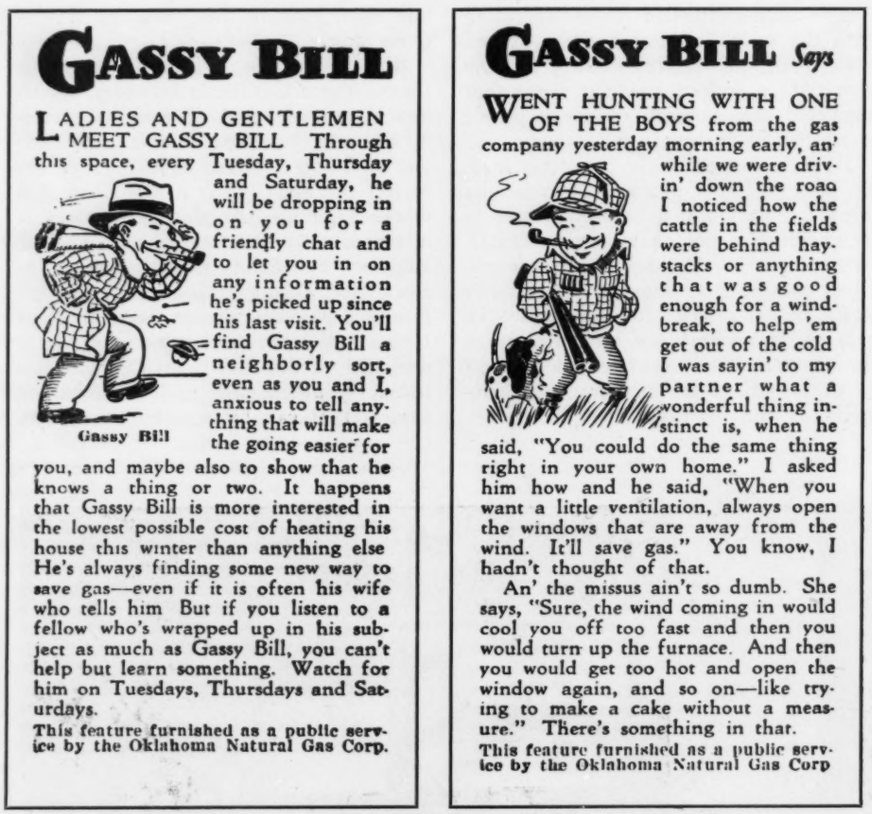
Members of the Oklahoma Natural organization are encouraged to take an active part in civic affairs. One manager recently was named chairman of a committee to organize the various charity and welfare bodies of his city into a community fund. Another member of the organization acted as chairman of a committee which coordinated the activities of the charity and welfare organizations in Tulsa. A manager at one of the smaller towns has been secretary of the American Legion post continuously since it was organized.

Constant assistance is given by members of the organization to Chamber of Commerce, Community funds and various other organizations of general civic interest and benefit.

Safety work has been one of the company's most important projects because of its value to others and because of the great savings effected by safe and sane operations by company employees.

Each district has a thoroughly trained safety team. Each team member is an expert in first aid work. Safety teams also have been invaluable for demonstration work before civic clubs and kindred organizations.

The company also has in operation in Tulsa and Oklahoma City, emergency


GASSY BILL
LADIES AND GENTLEMEN MEET GASSY BILL Through this space, every Tuesday, Thursday and Saturday, he will be dropping in on you for a friendly chat and to let you in on any information he's picked up since his last visit. You'll find Gassy Bill a neighborly sort, even as you and I, anxious to tell anything that will make the going easier for you, and maybe also to show that he knows a thing or two. It happens that Gassy Bill is more interested in the lowest possible cost of heating his house this winter than anything else He's always finding some new way to save gas—even if it is often his wife who tells him But if you listen to a fellow who's wrapped up in his subject as much as Gassy Bill, you can't help but learn something. Watch for him on Tuesdays, Thursdays and Saturdays.
This feature furnished as a public service by the Oklahoma Natural Gas Corp.
Gassy Bill
GASSY BILL Says
WENT HUNTING WITH ONE OF THE BOYS from the gas company yesterday morning early, an' while we were drivin' down the road I noticed how the cattle in the fields were behind haystacks or anything that was good enough for a windbreak, to help 'em get out of the cold I was sayin' to my partner what a wonderful thing instinct is, when he said, "You could do the same thing right in your own home." I asked him how and he said, "When you want a little ventilation, always open the windows that are away from the wind. It'll save gas." You know, I hadn't thought of that.
An' the missus ain't so dumb. She says, "Sure, the wind coming in would cool you off too fast and then you would turn up the furnace. And then you would get too hot and open the window again, and so on—like trying to make a cake without a measure." There's something in that.
This feature furnished as a public service by the Oklahoma Natural Gas Corp

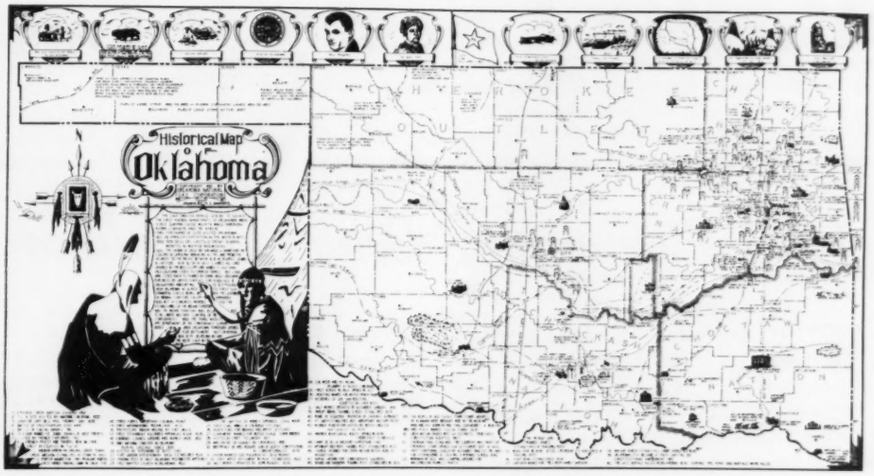
"Gassy Bill" answered all complaints of Oklahoma Natural Gas Corp.'s consumers last winter through the medium of the daily papers, advertisements similar to those above appearing three times weekly in newspapers throughout the state.

cars, fully equipped to fight fire and with crew capable of giving first aid with the complete equipment which the cars carry. The car in Tulsa answers each second alarm, while the car in Oklahoma City is called by radio direct from the fire department alarm office. Each car makes anywhere from one to eight runs daily.

On several occasions the cars have directly saved lives. The company works in complete harmony with the fire departments of both cities. The safety experts who trained the Oklahoma Natural men in these cities, gave the same course of instructions to firemen. Classes also were held for firemen in Shawnee and for policemen in Tulsa.

In order to select a safety team to represent the company in the state utilities association contests, an intra-company meet was held with the team from Morris winning, which later won the state contest.

The company inadvertently won considerable public favor with the Tulsa emergency car during the Christmas Holidays by assisting one of the Tulsa newspapers in its holiday program of collecting old toys to be repaired by the Tulsa Fire Department and distributed to children of impoverished families. The Oklahoma Natural safety car paraded down-town streets three days advertising the plan, carrying large banners and being further adorned by two members of the girl's safety team and a Santa Claus.



Historical spots throughout the state of Oklahoma are marked by tablets placed by Oklahoma Natural Gas Corp. A map of these landmarks was made by Harry Z. Sanders, the company's master draftsman.

600,000 BOSSES
to serve—
600,000 Customers
to please
THE O. N. G. "trouble shooter" is a big factor in the UNINTERRUPTED, PERFECTED service which O. N. G. renders to more than 600,000 Oklahoma citizens,—600,000 who command him daily.
This husky, two-fisted fellow does not work by the clock. If there were 25 hours in every day he would be available in any or every one of them, for any and every kind of emergency. At 2 a.m. in zero weather he shoulders his tools with a grin and battles a blizzard, in order that a cracked main may be repaired and your gas service may not fail for even a split second.
O. N. G.'s reputation for UNINTERRUPTED service depends on two big factors—first its great interconnected system which places 40 different major gas fields at the service of every city supplied by O. N. G.—second its vast organization of skilled mechanics, trained technicians and other loyal "trouble shooters"—to whom no job is too difficult and no obstacle insurmountable.
These men are at your command when anything goes wrong. They know their business. They are available at any hour, day or night. They typify the ideal of "100% Service to the Customer" which the company's new management has made the watchword in every department of this business.
"Dependable Gas Service, Yesterday, Today, Tomorrow"
OKLAHOMA NATURAL GAS CORPORATION

Oklahoma Natural's institutional advertising tells the story of the company's dependable service and the economy of gas as a fuel.

Home Service

An active home service program is another feature of consumer service which is stressed by Oklahoma Natural. The company maintains home service bureaus in Tulsa and Oklahoma City, under the supervision of Misses Florence Rush and Elizabeth Leach in Tulsa and Miss Mildred Clark in Oklahoma City.

The usual program of lectures and demonstrations and home visits is followed. The home service department quarters are often used by clubs and similar organizations for meetings and in some cases for church lunches, food being prepared and sold by the church women to raise funds for their activities. There is no charge by the company, which also provides the tables and chairs.

The home service demonstrators also prepare weekly food articles for the newspapers, giving seasonable menus which are of assistance to housewives. These stories appear on the food pages and it has been definitely shown that women read these articles eagerly.

Picnic Facilities

Utilization of a beautifully wooded compressor station site during the summer months as a picnic and recreation grounds has proven to be very popular in Tulsa. So ideal were its natural features that it was adaptable for such purposes with a minimum of expense to the company.

A cooling pond, used in the winter for plant operations, was made into a swimming pool. There are two croquet courts, four or five horseshoe pitching ranges, and a playground ball diamond. In addition, there are tables and benches for picnic meals, which can be prepared on four adjacent gas-fired ovens.

The station was thrown open on June 1 for use to civic clubs, churches, schools, business houses and similar groups, and nearly 1,000 persons per week have enjoyed the features there.

The company was able to make a substantial contribution to the American Legion's campaign against unemployment in an effective manner. The publicity department worked almost full time for an entire week writing publicity for the Legion and supplied enough copy to each Tulsa newspaper for a Sunday section. Outside of the opportunity of doing a public service, the company's only benefit was in a list of 101 suggestions for work in which reference was made to the installation of gas appliances.

Not only with the American Legion, but with other organizations, has the Oklahoma Natural cooperated wholeheartedly. Speakers and entertainment features are constantly available for service club meetings. Employees who are members of these various organizations are alert for opportunities to provide programs, as well as to be willing at all times to be unselfishly helpful in club activities.

Earlier in this article, mention was made of cooperating with one of the Tulsa newspapers in its Christmas program. Assistance also was given the other newspaper of the city on its particular project, which was the singing of

(Continued on Page 44)

Pacific Coast Gas Association

Managing Director: Clifford Johnstone
Association Headquarters:
447 Sutter Street, San Francisco

President: H. L. Masser
Vice-President and Executive Engineer,
Los Angeles Gas and Electric Corp.

1933 Committees Being Organized

THE excellent work done by committees of the Pacific Coast Gas Association has made our annual Conventions an important event in the gas industry, and has placed our Proceedings, and other publications, in great demand everywhere.

The success of our committees is due, primarily to the active interest taken in this gratuitous work by so many members of the Association, and, secondarily, to the excellent organization which the Association has built up permitting close supervision of the committee work by experienced men, and providing for the continuous study of the more important problems.

The organization of the 1933 committees is already well advanced, and, as always, every member of the Association is invited to offer suggestions and to enroll as a committee worker. As an aid to those who desire to offer suggestions, or to volunteer as members of committees on specific subjects, we are publishing below the names of those leaders who make up the standing executive committees of our various sections. A communication to any of these men, or to the Secretary's office, will receive prompt attention:

ACCOUNTING SECTION

General Chairman

R. N. Dreiman, Pacific Public Service Co., San Francisco, Cal.

Executive Committee:

S. A. Horner, British Columbia Electric Power & Gas Co., Ltd.; C. A. Hulse, Central Arizona Light & Power Co.; R. N. Dreiman, Pacific Public Service Co.; W. E. Houghton, Los Angeles Gas and Electric Corp.; E. W. Hodges, Pacific Gas and Electric Co.; C. W. Platt, Portland Gas & Coke Co.; M. B. Fowler, San Diego Consolidated Gas and Electric Co.; A. B. Carpenter, San Joaquin Light & Power Corp.; G. A. Detrick, Southern California Gas Co.; W. J. McCoy, Southern Counties Gas Co.; B. H. Hoke, Spokane Gas and Fuel Co.; Paul R. Enright, Eastern Oregon Light and Power Co.; Herbert Painter, Tucson Gas, Electric Light & Power Co.; P. R. Dunbar, Seattle Gas Co.; I. L. Comstock, Montana Power Co.

COMMERCIAL SECTION

General Chairman

Forrest U. Naylor, Pacific Gas and Electric Co.

Executive Committee:

Ray Finch, Northwest Cities Gas Co.; J. Earl Jones, Seattle Gas Co.; Edwin Badger, Spokane Gas & Fuel Co.; J. Fremont, British Columbia Electric Power & Gas Co., Ltd.; A. F. Morairty, Central Arizona Light & Power Co.; Pierre Vinet, Coast Counties Gas & Electric Co.; Frank Weiss, Los Angeles Gas and Electric Corp.; H. M. Crawford, Pacific Gas and Electric Co.; John H. Hartog, Portland Gas & Coke Co.; A. E. Holloway, San Diego Consolidated Gas and Electric Co.; Monty Pfyl, San Joaquin Light and Power Corp.; F. M. Banks, Southern California Gas Co.; C. H. Potter, Southern Counties Gas Co.; O. S. Clifford, Sierra Pacific Power Co.; R. W. Coblentz, Washington Gas & Electric Co.

MANUFACTURERS' SECTION

General Chairman

R. L. Hinckley, General Water Heater Corp.

Executive Committee:

W. J. Bailey, Day & Night Water Heater Co., Ltd.; R. L. Hinckley, General Water Heater Corp.; R. C. Hoyt. Hoyt Heater Co. of Northern Calif., Ltd.; H. W. Jackson, Jas. Graham Mfg. Co.; D. P. O'Keefe, O'Keefe & Merritt Co.; Andrew Kerr, Steiger & Kerr Stove & Foundry Co.; W. J. McLaughlin, McLaughlin Sheet Metal Works; E. L. Payne, Payne Furnace and Supply Co.; J. M. Williams, Williams Radiator Co.

PUBLICITY AND ADVERTISING SECTION

General Chairman

F. H. Holden, Southern California Gas Co.

Executive Committee:

James Lightbody, British Columbia Electric Power & Gas Co., Ltd.; Muriel Crothers. Seattle Gas Co.; J. H. Hartog, Portland Gas & Coke Co.; A. C. Joy, Pacific Gas and Electric Co.; Ella Russell, Coast Counties Gas & Electric Co.; Alma Freeburg, Natural Gas Corp. of Calif.; E. P. Ramsay, Los Angeles Gas and Electric Corp.; F. H. Holden, Southern California Gas Co.; W. D. Thurber, Southern Counties Gas Co.; F. M. Raymond, San Diego Consolidated Gas and Electric Co.

PUBLIC RELATIONS SECTION

General Chairman

D. L. Scott, Los Angeles Gas and Electric Corp.

Executive Committee:

W. H. Barton, Montana Power Co.; F. H. Bivens, Southern Counties Gas Co.; T. E. Roach, Washington Gas and Electric Co.; George A. Campbell, Sierra Pacific Power Co.; Edward H. Coe, Central Arizona Light & Power Co.; R. E. Easton, Santa Maria Gas Co.; H. L. Farrar, Standard Management and Operating Corp.; Lloyd Henley, San Joaquin Light and Power Corp.; F. H. Holden, Southern California Gas Co.; W. C. Hornberger, Arizona Edison Co.; James Lightbody, British Columbia Electric Power and Gas Co., Ltd.; J. L. McKean, West Side Natural Gas Co.; Geo. L. Myers, Portland Gas & Coke Co.; J. F. Pollard, Seattle Gas Co.; M. A. Pooler, Tucson Gas, Electric Light & Power Co.; W. F. Raber, San Diego Consolidated Gas and Electric Co.; Don C. Ray, Pacific Gas and Electric Co.; D. L. Scott, Los Angeles Gas and Electric Corp.; J. L. Stone, Spokane Gas & Fuel Co.; H. M. Thomas, Northwest Cities Gas Co.

Mr. Scott has already appointed Miss Jeanette Rees, of the Southern California Edison Company, as Chairman of the Womens' Committee, with Miss Clyda Weems, of the San Joaquin Light and Power Company as Vice-Chairman. These appointments continue the policy of operating the Womens' Committee in cooperation with the Pacific Coast Electrical Association.

TECHNICAL SECTION

General Chairman

Guy Corfield, Los Angeles Gas and Electric Corp.

Executive Committee:

W. C. Hornberger, Arizona Edison Co.; John Keillor, British Columbia Electric Power & Gas Co.; Roy T. Richards, Central Arizona Light & Power Co.; A. E. Hall, Standard Management & Operating Corp.; H. L. Masser, Los Angeles Gas and Electric Corp.; R. R. Ripley, Montana Power Co.; H. M. Thomas, Northwest Cities Gas Co.; W. S. Yard, Pacific Gas and Electric Co.; E. L. Hall, Portland Gas & Coke Co.; J. J. Ferrari, Sierra Pacific Power Co.; G. Patrick Johnson, Puget Sound Power & Light Co.; L. M. Klauber, San Diego Consolidated Gas and Electric Co.; W. F. Tyler, San Joaquin Light and Power Corp.; Allen Fesler, Santa Maria Gas Co.; Wm. Moeller, Jr., Southern California Gas Co.; A. F. Bridge, Southern Counties Gas Co.; R. A. Hoffman, Spokane Gas & Fuel Co.; Wm. I. Battin, Seattle Gas Company; Claude Webber, Tucson Gas, Electric Light & Power Co.; F. C. Hawks, Washington Gas & Electric Co.

Mr. Corfield has already made the following appointments:

B. M. Laulhere, Southern California Gas Co.
Chairman of the Natural Gas Transmission Committee.

C. P. Johnson, Puget Sound Power and Light Co.
Chairman of the Production Committee.

F. A. Hough, Southern Counties Gas Co.
Chairman of the Distribution Committee.

Standing Technical Committees:

The work of the three main divisions of the Technical Section, which will be presided over by Messrs. Laulhere, Johnson and Hough, is also guided by per-

manent Standing Committees. These are as follows:

Standing Natural Gas Transmission Committee:

A. F. Bridge, Southern Counties Gas Co.; H. P. George, Southern California Gas Co.; F. F. Doyle, Pacific Gas and Electric Co.; A. R. Bailey, Coast Counties Gas & Electric Co.; R. R. Ripley, Montana Power Co.; C. W. Beck, Los Angeles Gas and Electric Corp.

Standing Production Committee:

T. N. Kellett, Los Angeles Gas and Electric Corp.; Frank Wills, Pacific Gas and Electric Co.; W. H. Dreaper, British Columbia Electric Power & Gas Co.; N. H. Wardale, Portland Gas & Coke Co.; F. C. Hawks, Washington Gas & Electric Co.; J. A. Harritt, San Diego Consolidated Gas and Electric Co.; W. R. Alexander, Seattle Gas Co.; R. A. Hoffman, Spokane Gas & Fuel Co.; Roy T. Richards, Central Arizona Light & Power Co.; C. H. Webber, Tucson Gas Electric Light & Power Co.; C. Patrick Johnson, Puget Sound Power & Light Co.; J. J. Ferrari, Sierra Pacific Power Co.; W. C. Hornberger, Arizona Edison Co.; H. M. Thomas, Northwest Cities Gas Co.; A. E. Strong, Natural Gas Corp. of Washington.

Standing Distribution Committee:

W. M. Henderson, Los Angeles Gas and Electric Corp.; R. S. Fuller, Pacific Gas and Electric Co.; D. B. Larson. Portland Gas & Coke Co.; D. H. Perkins, San Diego Consolidated Gas and Electric Co.; W. F. Tyler, San Joaquin Light & Power Corp.; Lee Holtz, Southern California Gas Co.; C. J. Melrose, Spokane Gas & Fuel Co.; F. W. Sauer, Seattle Gas Co.; A. R. Bailey, Coast Counties Gas & Electric Co.; C. E. Rutledge, Southern Counties Gas Co.

Proceedings

THE Secretary's office is now actively engaged in assembling and editing material which will make up Volume 23 of the Association's Proceedings. Every effort is being made to secure early publication.

In the meantime, the address of John P. Coghlin, entitled "The Public and the Public Utilities" and the address of Geo. L. Myers, entitled "The Rising Tide of Revolt," are being printed in pamphlet form and will shortly be distributed to all members of the Association. While announcement concerning the distribution of the Proceedings will be sent out later, it is probable that the printing will be limited and distribution made only to those members specifically requesting copies.

Cooperative Range Advertising Studied

SEIZING the opportunity afforded by the presence of P. O. Deitsch, Group Manager of the Manufacturers' Section of the American Gas Association, at the Del Monte Convention, members of the Gas Range Division of the Manufacturers' Section, under the leadership of its Chairman, Andrew Kerr, held several meetings with Mr. Deitsch at the Convention, and during the week following the Convention, to study the plans of the National Range Manufacturers for a cooperative merchandising campaign, with the possibility of extending this campaign to include Pacific Coast states. Mr. Deitsch was obliged to return East before a decision on Pacific Coast participation could definitely be reached, and further consideration has been postponed until October 6th, at which time the Range Manufacturers will meet at the Los Angeles Biltmore Hotel. John A. Fry, Chairman of the National Advertising Committee of the Manufacturers' Section of the American Gas Association, is expected to attend this meeting.

In Recognition of Individual Achievement

THE Addison B. Day Medal of Honor, awarded for the first time at the Del Monte convention, is reproduced here for the interest of Association members. As previously announced in these columns, this annual award, to which all members of the Association are eligible, is made available through the generosity of Addison B. Day, president of the Los Angeles Gas and Electric Corp. Mr. Day served as president of the Association in 1920 and has always maintained a very active interest in its enterprises.

The torch embossed on the medal is emblematic of the gas industry; the garlands of laurel signify the victories gained; the Latin inscription "Propter Maximum Utilitatem" may be translated "For the Greater Service."

Awarded annually to the member judged to have done the most for the industry's advancement, the Addison B. Day Medal of Honor represents a splendid tribute to individual achievement. Frank Wills of the Pacific Gas and Electric Co. has the distinction of receiving the first award, as covered in last month's issue.

Payne Furnace Entertains Southern Counties Salesmen

On Wednesday evening, September 7, the entire sales force of the Southern Counties Gas Co. of Los Angeles, Calif., was entertained at dinner by the Payne Furnace & Supply Co. at the Cottage Inn in Beverly Hills. The dinner was followed by a sales meeting, giving detailed information on the procedure for figuring costs on central heating plants, preparatory to the winter campaign on these appliances being inaugurated by Southern Counties Gas Co. Among the principal speakers were E. L. Payne, president, Payne Furnace & Supply Co.; F. H. Bivens, vice-president in charge of sales, Southern Counties Gas Co.; Clyde H. Potter, sales manager, Southern Counties Gas Co., and J. Lyle Vance, industrial sales manager, Payne Furnace & Supply Co.

Southern Counties Gas Co. has already begun a campaign for the sale of gas-fired warm air equipment, including basement and floor furnaces and consoles manufactured by the Payne Furnace & Supply Co. Envelope stuffers announcing a special offer for a limited time on these appliances were sent out with the September bills to consumers throughout the territory.

Dreaper Named Manager at Victoria for B. C. Power & Gas

W. H. Dreaper, superintendent of production for the British Columbia Electric Power & Gas Co., Ltd., Vancouver, B. C., has been appointed to the post of manager of the gas department for the company at Victoria, taking the place of F. H. Hewlings, retired.

Mr. Dreaper entered the service of British Columbia Electric Power and Gas Co. in 1910 as chief draftsman. In 1916 he was placed in charge of the mains and service department, and transferred to the gas works as superintendent in charge of production in 1917, which post he has held until this time.

Northwestern Natural Gas Co. Adding Three Towns to System

Construction began early in September on a 6-inch natural gas transmission line from Grandview, Wash., to Toppenish by Northwestern Natural Gas Co. with district offices at Grandview. The line will be approximately 18 miles long and will also serve Granger and Zillah. A franchise was granted to the company in Zillah about a month ago. The company plans to serve about 600 customers in the three towns. Supply for the line will come from the Benton County field. Cost of the project is estimated at $250,000.

Campbell to Manage Pasadena Office for Los Angeles Gas and Electric

GEORGE S. CAMPBELL, assistant superintendent gas distribution for Los Angeles Gas and Electric Corp., in charge of the Pasadena and Alhambra Districts, has been named to take over the duties of Jas. F. Tickner, who retired September 1 as manager of the Pasadena District office of the utility.

Geo. S. Campbell

In his new capacity, Mr. Campbell will be in charge of both the commercial and distribution activities for the Pasadena District, and will retain supervision over the distribution work in the Alhambra District. The appointment, which was announced by Addison B. Day, president and general manager of Los Angeles Gas and Electric Corp., comes as an advancement for Mr. Campbell in recognition of 29 years of faithful service.

1933 GAS APPLIANCE PREVIEW

Hart Urn Burner

HART Manufacturing Co. has developed a Bunsen type gas burner, which was designed for use in conjunction with the Hart gas brooder.

This burner has now been placed on the market to be used for coffee urns, and similar appliances.

The burner has several new features of construction, including a special arrangement for the gas ports. It is stamped on a punch press, giving 52 separate outlets, in staggered position, each port being the same size and receiving the amount of secondary air necessary to give good combustion. The burner will remain ignited around its full circumference whether maximum or minimum flame is desired, and the entire burner is ignited when any part of it is burning.

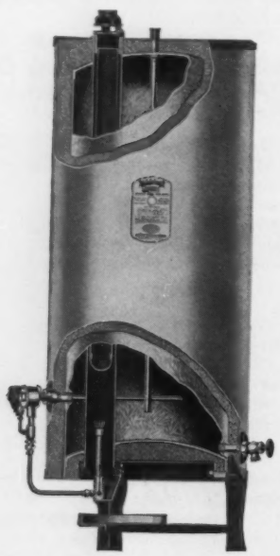
The ports are so arranged by using specially constructed plates, that it is not necessary to use a fire screen, as back-firing will not occur.

This burner may be used with all types of gases, including the liquefied petroleum gases.

Welsbach Hotzone Special

THE Welsbach Co. announces a new line of self-action storage gas water heaters known as the "Hotzone Special."

Hotzone Special heaters are manufactured in 45-gallon and 60-gallon sizes and are equipped with the new Welsbach Reflex



automatic burner, having incorporated in it a safety gas shut-off.

The tanks of these heaters are made of heavy gauge galvanized steel tested at 300 pounds per square inch and are completely insulated.

The flue and baffle are designed to accomplish maximum heat transfer to the water in the tank, the baffle being removable.

Rating—2,500 to 5,000 B.t.u.

The cost of operation can be pre-determined and this amount will never be exceeded.

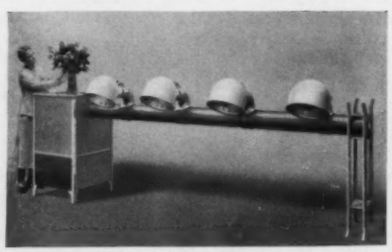
AT this season of the year new business departments of utilities are giving thought to the newest and latest in gas appliances to be featured in their 1933 sales programs. It is therefore particularly appropriate to present the following "1933 Appliance Preview", participated in by a considerable number of manufacturers at the invitation of "Western Gas."

"Miss America" Hair Drier

SEVERAL improvements have been incorporated in the "Miss America" hair drier.

The "Miss America" has a single gas-fired furnace that heats the drying air which is delivered to a group of individual service equipments. The furnace flue passes through the warm air duct, which prevents condensation.

When all service outlets are shut-off, a pilot keeps the air warm, dry and ready to use. At other times, a thermostatically controlled gas valve keeps the drying air at any temperature desired.



The patron can raise or lower the hood, and increase or decrease the volume of air. Each hood is hinged and may be removed and a blowing nozzle substituted.

Groble Service Regulators

GROBLE Gas Regulator Co. presents two features for 1933, the new steel lever and the new vent cap.

In the new steel lever all working parts are rust-proofed, strengthening the lever, and reducing the friction on the lever pin. It holds the valve pocket more rigid.

The new vent cap replaces the mushroom vent cap. The new cap is designed to prevent rain or condensation entering through the vent and coming in direct contact with the diaphragm.

The Groble Gas Regulator Co. has also developed a new high pressure line regulator especially adapted to regulate gas to orifice meters.

Roper No. 3104 Series

THE new No. 3104 series of the George D. Roper Corp., represented by the accompanying illustration, is available in various color trims and designs. It can be furnished with Insta-Matic, full automatic con-

trol of both top burners and over burner or with oven temperature regulator without time control.

The new oven temperature regulator is concealed back of the burner box panel and is operated by radio dial type of control.

The Roper Sani-Speed Cooking Top is now available in two styles, i. e., with slotted burner lids or with open finger construction, as illustrated.

This range is constructed of cast-iron and steel, weighs 300 lbs., and is completely porcelain enameled both inside and out.

Other features available on this range are: New style embossed panels; the new Astogril cast-aluminum broiler; in-built Telechron electric time clock; insulated and ventilated "fresh air" ovens; easy-sliding utility drawer; Insta-Flame automatic lighting of oven and top burners; "self-slide" broiler; smokeless broiler pan; lifetime cooking chart burned into porcelain oven door lining; porcelain enamel oven linings; porcelain enameled leg rests of modernistic design; large ovens and cooking top; flue heat deflector, etc.

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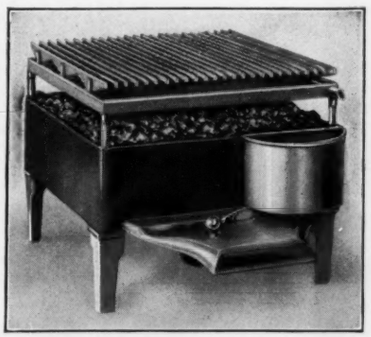


"Over-the-Fire" Grill

A NEW development of the year is the radiant "Over-the-Fire" grill, announced by the Homestead Heater Co.

The Homestead grill is built in units of 1 square foot. Thus, broilers of any size may be obtained by combining the required number of units. The illustration shows a single unit suitable for a small lunchcart or roadside stand.

This new grill uses the principle of radiant heat, providing a bed of red-hot glowing coals. In a fixed position over the bed of coals is a grill that collects the drippings and carries them to the drip pan. Each unit can be disassembled to the point where the burner can be removed without the use of tools.

Spark All-Gas Range

THE Hammer-Bray Co. of Oakland, Calif., has announced a new Spark "All-Gas" range with built-in gas circulating space heater.

The complete range has been approved by the American Gas Association with an input rating for the heater section of 20,000 B.t.u.'s.

The heating unit used is of streamline shape with radiating fins. The construction

permits the moving of a large volume of warm air, without overheating the air. The unit is finished in black porcelain and all seams are welded.

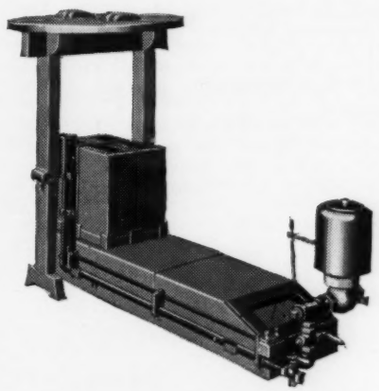
The heater is operated by the valve adjacent to the heater. A pilot light takes care of automatic lighting.

Sonner Heat Machine

THE Sonner Burner Co. announces improvements in its 1933 Heat Machine, having incorporated the following changes:

1. Telescoping adjustable draft box for primary and secondary air. This improvement aids particularly in warm air furnace installations by not having the draft box project too far out in front of the ash pit door.

2. The primary and secondary air door is arranged with positive rigid connection



for use with the combination draft and damper controls.

3. The Sonner automatic pilot is also adjustable and may be placed on either side or at the center of the burner unit heads.

4. The baffle supports are now cast with openings to provide cross supports for the cementing of the unused portion of the grate area. All of the secondary air entering through the draft box is forced through the burner.

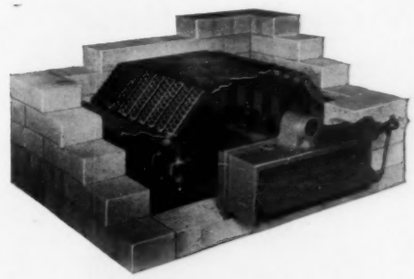
5. The baffle itself is now self-supporting in that it is composed of two semi-circular parts mounted above the burner head. These two parts tongue and groove together to maintain their permanent position in the fire box.

Manual control brass lever valves are now provided as auxiliary equipment with all Sonner automatic heat machines. Thus any unit of the heat machine may be operated automatically by the room thermostat at the customer's discretion.

D.F.C. No. 700 Gas Burner

THE new No. 700 low pressure gas burner placed on the market by the Denver Fire Clay Co., was designed especially for domestic and small power boilers, to operate on gas pressures from 3 to 8 inches of water. It consists of a series of inspirators and manifolds. The inspirators are all the same size but the manifolds vary in size, permitting maximum flexibility and adaptation to any size or shape of boiler furnace.

This burner does not depend upon draft

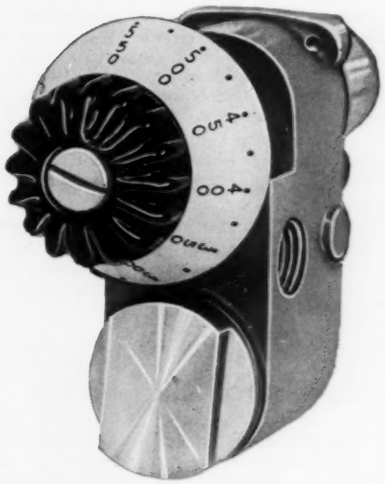


for air. The inspirators are designed to inspirate practically all the air necessary for complete combustion of the gas. Inspirator nozzles are set at such an angle that the hot gases are directed against the heating surfaces of the boiler. The design of the nozzle ports insures a short flame and complete combustion of the gas before it comes in contact with the heating surfaces of the boiler.

The space between the units and the sides of the boiler furnace and between the units on each side of the boiler is sealed with an insulating material.

Wilcolator Heat Control

THE Wilcolator Co. announces a new oven heat control, Type M, particularly adapted to crowded manifold assemblies. It is small and compact, being 1⅛ inches wide.



The design allows for direct connection to the oven gas cock.

The connection from the control valve to the thermal element is flexible and can be bent in as many directions as desired. This makes possible the use of the same thermostat on all range models. Provisions are made to compensate for the effect of temperatures from the cooking top burners.

The gas ports are large and direct. The control has gas capacity for the largest domestic range ovens.

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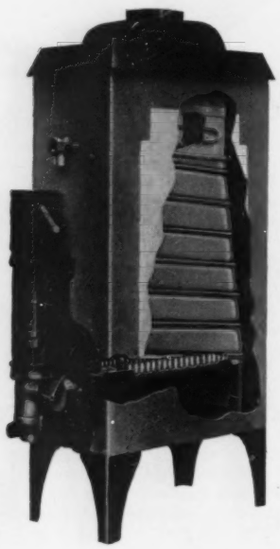
Watrola Water Heater

A NEWLY designed type of instantaneous water heater for bottled and piped gases is being manufactured and marketed by Watrola Corp., Ltd. New features of the water heater are: it heats by air transfer; has new type and speed of thermotractor safety shutoff; carbureting self-cleaning non-adjustable economy pilot; self-functioning non-adjustable burners; water flow governor; efficiency compensator; automatic and manual heat control; push-button gas valve; automatic safety fuel lock; and automatic safety fuse.



According to the manufacturer the new heater eliminates carbon monoxide, aldehydes, flame impingement, backfire, condensation and liming.

It may hang on wall or be set on the floor.

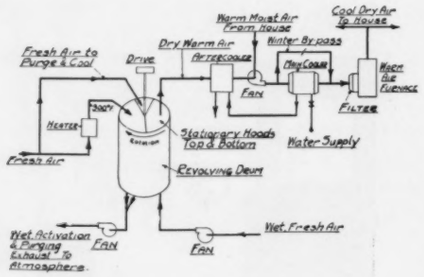
Specifications are: Weight 95 lbs.; half is copper and brass; one standardized external size for 2, 3 or 4 gallons per minute 70° or more rise; lacquered console cabinet.

Silica Gel System

THE Silica Gel dehydrator for summer and winter air conditioning is of the automatic continuous type. Beds of Silica Gel are mounted in a drum which slowly rotates between stationary hoods. These hoods conduct two air-streams through the drum. One air-stream is the air to be dried and the other is the heated air (300° F.) which drives the moisture out of the Silica Gel again, and up the stack. The several hoods and beds are sealed to prevent short-circuiting of the air. The rotating drum brings spent beds into the heating sector for re-activation, while the dried beds are fed into the airstream which is to be dehumidified.

The dehydrated air is first cooled to remove the heat generated by the extraction of moisture and then mixed with return air to give the desired humidity. The entire airflow is then cooled in an extended surface cooler and distributed to the conditioned space.

Recent results on existing installations indicate that a 700 c.f.m. dehydrator and 2,500 c.f.m. circulation and cooling system give the following conditions in a residence having 25,000 cubic feet of conditioned space:



	Outside	*Inside*
Dry Bulb Temp.	92° to 98°	80° to 85°
Moisture Content—		
Gr. per lb.	130 to 140	70 to 80
Relative Humidity	60% to 65%	40% to 45%

Operating requirements on the latest installation of this capacity are:

Gas at 500 B.t.u.
per cu. ft.....110 cu. ft. per hour
Water at 74° F.....33 cu. ft. per hour
Power.....1.27 K.W.H. per hour

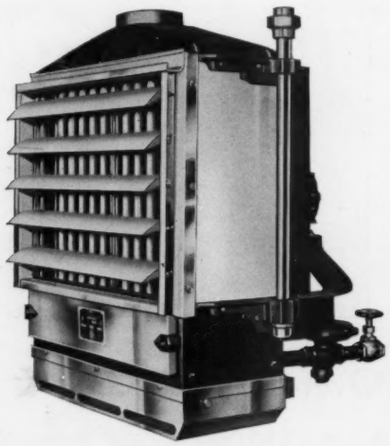
House Service Regulator

FISHER Governor Co. is introducing a new house service regulator, the outstanding feature of which is the accessibility for inspecting the valve and orifice seat or changing those parts. To renew the inner valve or inspect the parts, the regulator may be disassembled by means of a wrench which will fit a 1-inch union nut.

Leverage for sensitive control has been developed and a Pitot tube construction through the outlet gas channel is included in the design so that the reduced pressure is maintained at practically a constant value regardless of the volume being passed through the regulator up to within its maximum limits.

Surface Combustion Unit

SEVERAL new features of design are incorporated in the new Surface Combustion unit heater illustrated herewith. This heater is available in three sizes—for stores, service stations, garages, shops, auditoriums, airplane hangars, filling stations, and small buildings where the installation of a central heating plant is impractical or too costly.



Surface combustion unit heaters incorporate the following added features:

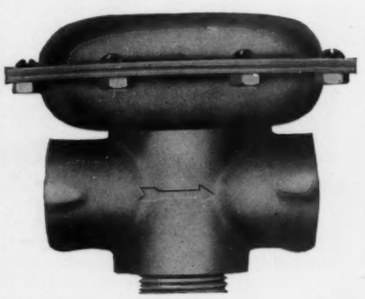
Two-stage atmospheric burner; is adaptable to outside air for combustion requirements; streamline heating tubes; corrosion and temperature resisting heating elements; chrome steel alloy metal; aluminum fan blades; protective control system; unit is completely assembled.

These heaters are finished in a combination of light green, black and polished aluminum.

Emco Gas Regulator

THE Emco ½-inch appliance regulator, manufactured by the Pittsburgh Equitable Meter Co., is a unit designed for controlling the burner pressure on space heaters, gas-steam radiators, small unit heaters, garage heaters and similar appliances.

It is of the dead weight variety and is factory equipped with the necessary weights to reduce average domestic line pressure to a constant burner pressure from 1 to 4 inches of water.



The diaphragm case is constructed of pressed steel and the body is cast. Sheepskin diaphragms are used.

The regulator can be furnished with either ½-inch or ¾-inch connections.

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14 Series Puritan Heater

MOORE Brothers Co., announces a new 14 Series Puritan gas heater. The new appliance has a 50,000 B.t.u. input capacity and an output capacity equivalent to 171 feet of steam radiation. The combustion chamber is of heavy cast iron and contains two burners, between which are two radiants.

If only one burner is necessary for the desired amount of heat, the use of the front burner will give both circulated and radiant heat, while the use of the back burner will give only circulated heat. The super-radiating back drum gives long flue travel.

The 14 Series is available in three finishes, two-tone walnut porcelain enamel, as shown in the illustration, plain finish black and the "velvet" finish which has a crackled effect in two tones of brown.

A.G.P. Water Heaters

THE American Gas Products Corp. division of the American Radiator Co., announces several new features in its automatic storage water heater. One feature is the passing of the hot flue gases through multiple flues of a shape that provides a large external flue area in proportion to the internal flue volume. This tends to insure the maximum transfer of heat to the water. These flues are joined together with the exception of several inches above the bottom head of the tank and below the top head of the tank, providing a column of water surrounded by the flue tubes.

All control features are in one valve. This valve is operated by changes of water temperature. It is also operated by thermostatic pilot and hand shut off. The control features embody the vapor tension principle.

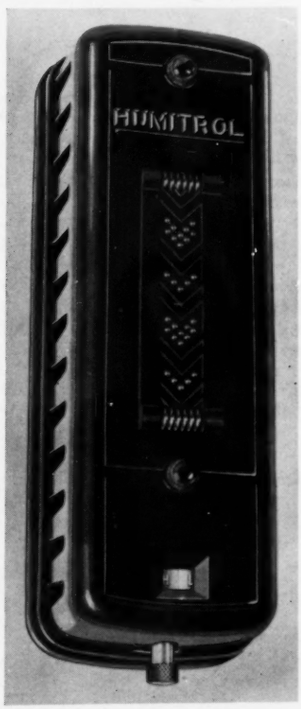
Other features include the built-in draft diverter, copper intake tube, steel jacket, thermostatic pilot shut-off and hand gas shut-off, drain cock, floor shield, condensation baffle and gas filter. The jacket is finished in high lustre baked enamel or in crinkled finish baked enamel.

The Lewis Humitrol

LEWIS Air Conditioners, Inc., announces the manufacture of the Lewis Humitrol to control the operation of equipment which may either add or withdraw moisture from the air. The Humitrol is set for the desired per cent of humidity by means of an adjusting screw to which is affixed a dial indicator. This indicator is visible through a small opening at the bottom of the front face on the cover.

The Humitrol is operated by the amount of moisture present in the air. An hydroscopic, ribbon type, element expands or contracts as the moisture content of the air varies. This action operates a lever mechananism, which in turn operates a mercury tube switch. This switch starts or stops the humidification or dehumidification equipment.

Both cover and base are of dark walnut Bakelite. The working mechanism is protected within the cover and insulated. Overall dimensions are: width, 2⅞ inches; length, 7⅞ inches; depth, 1¾ inches. Precision machined rollers are used at each bearing



point to insure free movement of the ribbon element as expansion or contraction takes place. Die-formed metal parts are used. A tension release pin protects the ribbon element against spring tension during times when the relative humidity may exceed 70 per cent due to conditions not under control.

All Humitrols are calibrated at the factory for a maximum operating range within three per cent plus or minus of setting. Humitrols may be calibrated to maintain any relative humidity up to 70 per cent.

New Reliance Device

A NEW ¼-inch regulator has recently been added to the line manufactured by the Reliance Regulator Corp. The new device is for gas refrigerators and laboratory bench work exclusively. It is small in size and makes a compact installation for crowded quarters.

Reliance low pressure appliance regulators, for control of low pressure gas, are designed for controlling pressure to water heaters, furnaces, gas refrigerators and other gas appliances requiring positive control of operating pressures.

These units can be obtained in standard pipe sizes from ⅜-inch to 3 inches inclusive. Where desired an automatic cut-off valve can be installed that protects customers' appliances should the gas supply fail or distribution pressure become dangerously low.

Paramount Gas Burner

THE Paramount conversion gas burner, recently brought out by Bialosky Bros. & Co., is a blower type burner, consuming from 30-150 cubic feet of gas per hour. The burner head and baffle plates are put in the

furnace through the firing door, resting on the grate bars. It can be installed or removed in a short space of time. Each of the component parts, motor, blower, gas pressure regulator, mechanically operated gas valve and burner head are designed for synchronous operation. The burner head is of

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heavy cast iron with a series of vertical slots around its outside periphery, and can be supplied in the round or the rectangular shape. Both flame and hot gases are confined to a space of 1½ inches from the fire pot by heavy cast iron baffles until near the top of the fire pot where spiral spacer blades swing the hot gases of combustion into a swirling motion before going into the furnace radiator or boiler flues. The gas supply valve is operated by a fly-ball governor on the lower end of the motor shaft. Before the gas supply valve is opened, air is first blown through the burner. After the gas valve is closed, the motor continues in operation a few seconds blowing air through the burner, cleaning out all residue and unburned gases.

An electric safety pilot prevents the starting of the fan or the opening of the gas valve without the pilot being lighted. A room thermostat wired in series with the safety pilot regulates the operation of the burner to the heating requirements of the building in which it is used.

Madsen Series 34

MADSEN Iron Works Ltd. announces the new 1932-1933 Madsen cuisine range for hotel, restaurant, and institution use, embodying three features: Insulated oven,

Madsen Cuisine "Hot Top"

thermostatic oven control, and smooth front with hidden manifolds.

Series 34 is designed to burn natural, manufactured, air-butane, and other types of gas fuel.

Models in the series include "Hot-top," "Griddle-top," "Open-top," with or without ovens; also accessories including single and double high shelves, griddle and open burner extensions, and spreader plates.

▼ ▼ ▼

Mueller Furnace Casings

L. J. MUELLER Furnace Co. announces, for 1933, the introduction of newly designed casings for the complete line of "Gas-Era" cast iron furnaces, in gravity and forced air types.

The new style casing conceals manifolds, burner cocks, clean-out covers and other equipment on the front of the furnace, and through insulation reduces radiation loss.

Casings are of multiple unit design, permitting the assembly of as many furnace sections as are needed for the job. Joints are flush, connection being made on the inside by means of bolts and wing nuts. Removable mesh openings permit the introduction of air for combustion, and when removed, provide access for adjustment of burners and pilots, or removal of front sections of casing to permit cleaning of furnace.

The entire casing is finished in green prismatic lacquer. Mueller Climator air conditioning equipment may be installed in connection with Mueller furnaces.

Payne "New Series B"

THE "New Series B" furnace has been announced by the Payne Furnace and Supply Co. of Beverly Hills, Calif., incorporating the following features:

1. Secondary air supply duct paralleling the fire box insures uniform secondary air applied to every part of the burner. This supply is constant under all burning conditions.

2. Heating elements of all five sizes are factory assembled.

3. All smooth vertical surfaces free from "staggering" speeds the air flow through the furnace and makes possible the handling of more air at higher velocities on gravity or forced air type of installation.

4. Finished in sparkling orange crinkle with glossy black trim.

5. Easily accessible for all adjustments on burners, pilots, controls, etc.

6. Free from expansion and contraction noises due to each surface being power stamped into convex ridges.

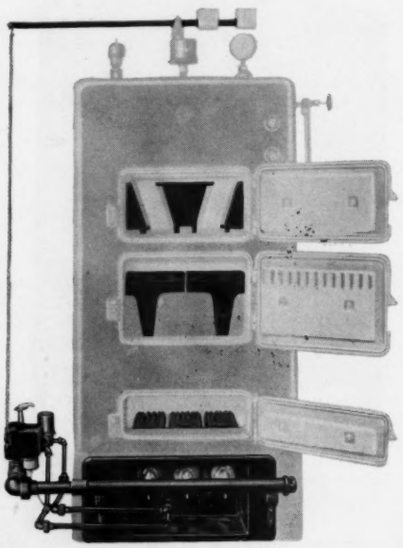
A-B "All Gas" Range

THE new A-B "All Gas" combination range is now being marketed by the A-B Stove Sales Co., Inc. The new range both heats and cooks with gas, at the same time or independently. It heats by circulation and radiation. Cold air is drawn from the room into the vented bottom of the flue box and passes around all sides of the box, absorbing the heat as it passes and is then discharged into the room through the register at the top. The heated air does not pass over the gas burner. In summer the grills may be used for cooking, giving the range a 6-burner top.

"Redflash" Converters

THE A. G. P. Redflash Convertor, manufactured by the American Gas Products Corp., a division of the American Radiator Co., is now on the market and is designed to be used with the Arco Redflash boiler.

Burner assembly and control equipment are mounted on a front panel casting which is bolted directly onto the boiler and replaces



the ash pit door frame. The combustion chamber baffles are held in place by supports already available in the boiler, while the three flue baffles slide into the flue passage ways. No screws, bolts or other means of fastening are necessary. The down draft diverter is of acid-proof vitreous enamel.

Controls are identical with those used on the Ideal gas boiler for several years and include throttling valve, solenoid valve, thermostatic pilot and automatic, low water cut-off.

Electrolux DeLuxe Line

ELECTROLUX Refrigerator Sales, Inc., has added three all porcelain De Luxe refrigerators to its regular line. The De Luxe line will be made in the household sizes, and will include EBP-58 De Luxe Hostess; ECP-5.5 De Luxe Baltimore; EBP-6.5 De Luxe Senator.

The general specifications and overall dimensions are identical with the same models in the regular line of Electrolux cabinets having lacquer finish.

In the event a panel becomes chipped in transit it may be replaced without the returning the entire cabinet to the factory.

Natural in Byron and Mantorville

Minnesota Northern Natural Gas Co., a subsidiary of Northern Gas and Pipe Line Co., is now serving natural gas in Byron and Mantorville, Minn.

Manufacturers Activities Reviewed at Cincinnati

AS THIS issue of *Western Gas* goes to press the Manufacturers' Section of the American Gas Association is assembled in its second annual conference, meeting at the Netherland Plaza Hotel, Cincinnati, Ohio. The meeting is a significant one, giving opportunity for review of the past year of group activities undertaken by the Section. Each of the divisions—range, water heater, space heater, gas-fired boiler and furnace, and gas-fired radiator—is holding a separate session on September 30. The opening general session, September 29, presided over by David F. Kahn, chairman of the Section, centers attention upon the range manufacturers' co-operative advertising campaign, discussed by John A. Fry, chairman of the Section's national advertising committee; and upon the Section's cross-licensing of patents program, reviewed by Paul Tappan, chairman of the Range Division's committee on this subject. Merle Thorpe, editor of Nation's Business, is turning the spotlight upon another field of action in which the Section has made progress, in his address on "Self-Regulation in Business vs. Government Intervention."

A number of A.G.A. headquarters staff representatives are appearing upon the program, including Alexander Forward, managing director; C. W. Berghorn, secretary of the Manufacturers' Section; Paul Ryan, statistician.

Philip O. Deitsch, manager of group activities for the Section, in his report to the conference, reviews and forecasts the manufacturers' program of action. He touches upon the notable progress made in institution of standards of practice, in which endeavor the manufacturers have applied self-regulation in preference to submitting their problems to the Federal Trade Commission or other governmental agencies. His report refers to the pitfall of selfish competition as represented in price cutting, stating that such practice has never created new markets, and that the remedy lies in mutual confidence and cooperation.

Mr. Deitsch's report touches upon the work of the various divisions in the field of safety ordinances. It also discusses the functioning of the Washington Service instituted at the recommendation of the Manufacturers' Section and already credited with helping to place over four billion cubic feet of new gas load during the five months of its operation. George W. Bean is the Association's Washington representative. After brief reference to the national advertising program, covered in detail in the address of Mr. Fry, Mr. Deitsch's report considers the future activities of the Section, suggesting as a desirable addition to its program a project for simplification and standardization as a means for economy in manufacture without sacrifice of quality in product.

B. F. Pickard

Robert W. Hendee

Reid S. McBeth

Fred W. Peters

Oklahoma Natural Personnel Changes

REALIGNMENT of executive functions has been announced by Oklahoma Natural Gas Corp., Tulsa, Okla., foremost of which is placing Vice-Presidents Robert W. Hendee and Ben F. Pickard in new assignments, and naming Fred W. Peters as comptroller.

Other executives affected are W. K. Cottrell, treasurer; W. Jennings Young, general sales manager; and Reid S. McBeth, assistant to President E. A. Olsen.

Mr. Hendee, senior vice-president, has been placed in charge of the western division with headquarters in Oklahoma City. He succeeds W. P. Canavan, who has resigned.

In his new assignment as vice-president in charge of operations, Mr. Pickard will direct the activities of the district offices, transmission and distribution systems, which serve 69 cities and towns in the state.

With the appointment of Mr. Peters a division of duties with the treasurer has been made. Mr. Peters has charge of all accounting, reparation of budgets, all statistical matter, tax reports and similar matters. Mr. Cottrell, as treasurer, has charge of all funds, supervision of all purchases and insurance.

Formerly directing head of public relations, Mr. McBeth in addition assumes all duties incident to that of assistant to the president and in the handling of executive routine. Mr. Young's department, formerly known as new business, becomes the sales department and is wider in scope.

Other changes bringing advancement to employees are announced in the Oklahoma Natural organization, according to R. S. Huffman, in charge of personnel.

L. A. Farmer, who has for some time served as assistant chief engineer, has been placed in charge of gas purchases and system load dispatching. Mr. Farmer has been associated with the company for more than 11 years and has served in practically every capacity in the operating department. In his new position he will deal directly with more than 1,100 Oklahoma producers from whom the company buys gas.

W. A. Hazard, formerly superintendent of the central transmission division, will take Mr. Farmer's place as assistant to B. L. Maulsby, the chief operating head. Mr. Hazard has been with the company 14 years.

Lee Prokop, with a 16-year service record, will assume the duties formerly performed by Mr. Hazard. His headquarters will be in Tulsa. Appointment of Noble Nordahl as superintendent of the Bearden field completes the changes in the transmission division.

The post of maintenance and construction superintendent for the entire system will be assumed by W. G. Van Arsdale, who in his new capacity will assist all division heads with jobs of major importance.

In the compressor station division, T. L. Padden of Tulsa will take direct charge of the important large station at Kellyville and E. E. Regan chief engineer at Kellyville, goes to the Bixby station. Claude E. Myers, chief engineer at Bixby, will take a similar post at Red Bird Station.

Three changes were made in the distribution division, A. F. Deen leaves Tulsa for Oklahoma City to assume the duties of distribution superintendent there. T. A. Wood, who had charge of Oklahoma City's distribution, comes to Tulsa in a similar capacity. Both are men of many years experience.

J. E. Mineo, who has served nearly 27 years in the Tulsa district, becomes superintendent of the Muskogee and Okmulgee districts.

Rio Grande Valley Gas Co. Moves Offices to Brownsville

Removal of the main office of the Rio Grande Valley Gas Co. from McAllen to Brownsville, Texas was announced early in September by R. B. Lloyd, vice-president. The change was expected to take place by Oct. 10.

The main office of the gas company has been located in McAllen since the opening of this company in the Valley 5 years ago.

Industry Gathering for A. G. A. Sessions

(Continued from Page 15)

Industrial Gas Section: Industrial Research—Selling Industrial Gas in Present Competitive Market—Open Forum: Baking, Hotels and Restaurants, Ceramics, Metal Melting, Steam Generation, Miscellaneous Application.

Natural Gas Department: The Relation of Investment to Revenue; Its Effect on Public Relations—Service and Sales of Proper Appliances—Our Competitors—Attitude of Public Utility Commissions Toward the Utilities.

Publicity and Advertising Section: A.G.A. Motion Picture (a) "Ideal Fuel"; "Nature's Perfect Fuel."—National Advertising and Sales Organization—The All-Gas Kitchen.

Technical Section: Results of Pipe Joint Research at the A.G.A. Laboratory—Past and Future Practice on Pipe Joints—Practical Soil Corrosion Survey with the Shepard Soil Corrosivity Rods—Present Practice in Appliance Servicing—Gas Detection Instruments—The Gum Problem in City Gas—Purging Apparatus—Developments in Liquid Purification—Gas and Coke Making Properties of American Coals—Developments in the Past Year in Gas Manufacturing—Recent Work on Diaphragm Dressings—Thiocyanate: The Industry's Latest By-Product — Atmospheric Pollution.

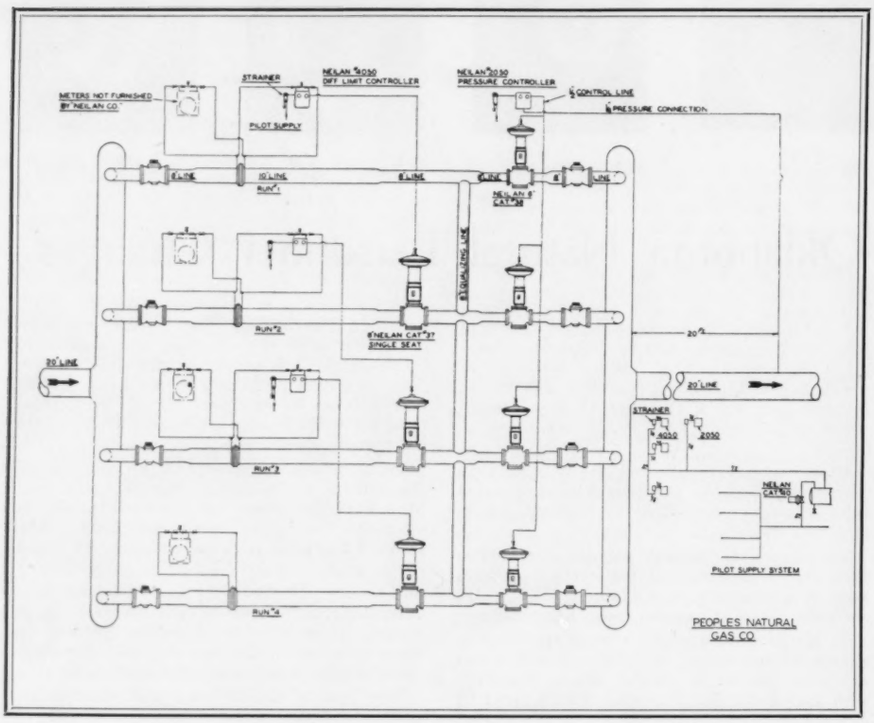


Fig. 1.

The Application of Rate Control To the Gas and Oil Industry

By E. H. HAMMOND
Assistant Chief Engineer
*Neilan Co., Ltd.**

THE purpose of this paper is to briefly outline and illustrate a few of the typical flow control problems encountered in the gas industry, as differentiated from those arising in the oil, chemical, and allied industries.

Although each illustration will represent an actual installation, the discussion will be qualitative rather than quantitative, and will be limited to the general methods and type of equipment developed to meet these problems.

In the oil and chemical industries the control of flow is usually in connection with systems involving the treating or processing of feed stock to obtain a refined or finished product. The term "flow control" then implies maintaining a constant rate of flow of a fluid, which may be air, gas, steam, or liquid. In such systems it is usually necessary that flow control be synchronized with the control of temperatures, pressures, and, quite often, with the level of liquids. The control of flow then becomes the independent variable which determines the accuracy with which the other control points can be maintained. Sudden changes in the rate of flow almost invariably will upset the other controlled points, and start the whole system surging. Therefore, it is essential that the rate of flow be held constant within very narrow limits, as otherwise the finished product probably would not meet specifications, and the resulting loss would be measured by the cost of the raw product, or the cost of re-running. Therefore, any instrument or device used to automatically control, or maintain a constant flow must be able to perform this function without at the same time upsetting other points of control.

In the gas industry, particularly in the distribution of gas to the consumer, the control of flow usually presents entirely different problems than those outlined above. Gas consumption generally is variable, with more or less periodic peak and minimum flows throughout the day and seasons. This requires extreme flexibility of the entire system, and all controls must be designed and selected to handle wide fluctuations and sudden changes in load. There are, of course, certain instances in the gas industry where constant flow is required, and typical installations to meet these requirements will be described later.

In general, however, the term "flow control" as used by the gas industry implies, not constant flow, but flows which can be automatically, or semi-automatically, varied in accordance with the consumer's demands.

All methods of controlling or measuring flow are based in some way on the fundamental relationship existing between pressure differential and the flow which results from that differential. Before there can be flow between two points in a continuous system, there must be a difference in pressure between those points.

Once the physical characteristics of a flow system are defined, the flow can be predicted for any value of pressure differential. This relationship existing between pressure differential and resulting flow is most familiar in the form of the orifice meter formula,

$$Q = C\sqrt{P_1\ h} \qquad (1)$$

where

Q = Units of flow per unit time.
C = The orifice coefficient.
P_1 = The initial absolute pressure.
h = The differential, or pressure drop, existing across the orifice.

This same relationship applied to the flow of gas in a pipe line is expressed by the basic flow formula,

$$Q = K\frac{T_0}{P_0}\left[\frac{(P_1^2 - P_2^2)\ d^5}{GTLf}\right]^{1/2} \qquad (2)$$

where

Q = Cu. ft. per hour at pressure and temperature bases of P_o and T_o
P_1 = Absolute inlet line pressure, pounds per sq. in.
P_2 = Absolute final line pressure, pounds per sq. in.
d = Internal diameter of line, inches
G = Specific gravity of gas (air = 1)
T = Absolute flowing temperature, °F.
L = Length of line, miles
f = Coefficient of friction
K = A constant

There are in use a number of formulae for determining the flow of gas in a pipe line. However, as a matter of interest, a recent paper by the U. S. Bureau of Mines entitled "Report of Investigations 3153" shows that the well known Weymouth formula best represents the true flow in a pipe line.

While on the subject of flow formulae, it may be of interest to note that equation (1) for the flow of gas through an orifice, and the Weymouth formula for the flow of gas in a pipe line can be combined, and the following equation obtained,

$$\frac{h}{d} = K_1\left(\frac{P_1 + P_2}{P_1}\right) \qquad (3)$$

where

d = pressure differential, lbs. per sq. in., existing between two points in a pipe line L miles apart.
K_1 = a constant combining the orifice coefficient and the fixed factors of the Weymouth formula.

In order to determine K_1 for any existing pipe line it is only necessary to take simultaneous values of P_1, P_2 and h.

*Presented before the Southern California Meter Association, August 25, 1932.

Either P_1 or P_2, usually will be known for any assumed flow condition as represented by the value of h.

Knowing P_1, the quadratic equation (3) can be solved easily for P_2, which will be the pressure at a point L miles downstream. Likewise, if P_2 is known, P_1 can be computed. Knowing the pressure drop in a transmission line for all likely values of h permits choosing the proper type and size of regulators or instruments to give the desired control of flow.

The scope of this paper will not permit going into the details of mechanical construction and operation of flow controllers and pressure regulators, but a few typical installations illustrating various types of control will be shown with a brief description of the operation and principle involved.

Fig. 1 shows an installation of an automatically controlled meter run, in which the pressure in the outlet header is maintained constant at a predetermined value, and additional runs are cut in as the load increases. The pressure control valves are all operated by one instrument type pressure controller. The spring ranges of the valves are so graduated that they open or close in sequence. The valves in Run No. 1 will be wide open before the valve in Run No. 2 starts opening; if the load continues increasing, No. 3 will follow No. 2, and No. 4 is available for maximum peak loads.

The metering of the load from minimum to maximum values is accomplished by differential limit controllers, which automatically cut in successive runs as the differential across the orifice plates reaches predetermined values. Thus the differential will never be greater than the maximum range of the instrument and an accurate record of the differential will be obtained for all values of flow. Run No. 1 is open to the flow of gas at all times. As the flow in this run reaches a set value, as indicated by the differential across the orifice, the limit controller opens the single seated shut-off valve in Run No. 2. This of course drops the differential across both meters, but if the load continues to increase, No. 2 Limit Controller will in turn open the valve in Run No. 3. As the load decreases, the last run to be opened will be the first to close, and if the load continues to decrease the limit controllers will eventually shut off all runs except No. 1. The pressure controller, and the limit controllers are pilot-operated, with the pilot supply taken from the reduced pressure side of the meter run through a special drip chamber and reducing valve.

The successful operation of so many runs in parallel requires the utmost sensitivity and reliability in the controls, as well as careful engineering in determining the orifice and valve sizes.

The installation shown in Fig. 2 was designed to take care of two widely different flow conditions. It consists of a differential rate of flow controller operating a specially constructed pilot operated reducing regulator. Part of the time the flow controller is cut out entirely, and the pilot operated reducing regulator maintains a constant reduced pressure of 400 pounds. At other times it is required that a constant rate of flow be maintained, rather than a constant pressure. The flow controller is then cut in to operate the regulator as a control valve. In order to protect the line from excessive pressure, provision is also made in the pilot of the regulator to close the valve entirely if the low side pressure exceeds 400 pounds.

The change from pressure to flow control, or the reverse, is made easily by opening or closing a by-pass in the pilot supply line.

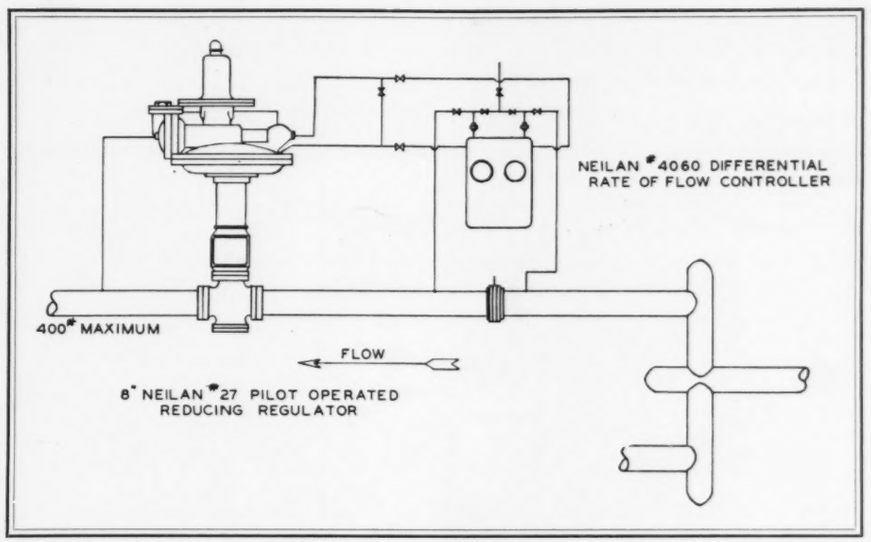


Fig. 2. Installation for maintaining either constant flow with maximum pressure cut-out, or constant reduced pressure.

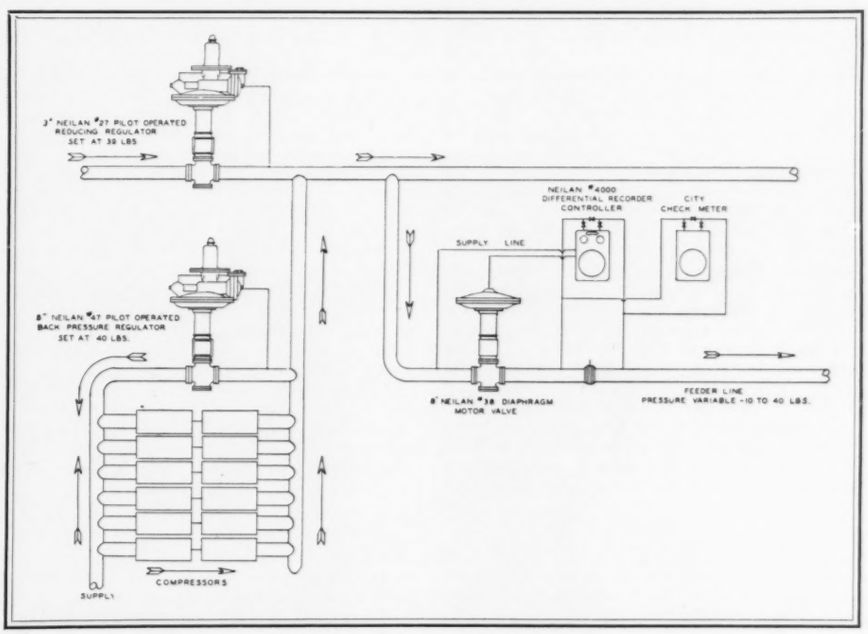


Fig. 3. Installation for maintaining constant flow through city feeder line.

Fig. 3 shows another installation for maintaining a constant rate of flow. A battery of compressors discharges into a distribution line from which a feeder line is taken to supply a neighboring city with a constant volume of gas. A constant pressure is maintained on the discharge of the compressors by means of a pilot-operated back pressure regulator in a by-pass from the discharge to the suction of the compressors. A pilot-operated reducing regulator set 1 pound below the discharge pressure will open to supply gas from a high pressure main in the event some of the compressors go down. A differential recorder controller, operating an 8-inch diaphragm motor valve, maintains a constant flow in the feeder line to the city's distribution system in which the pressure varies from 10 to 40 pounds. A typical chart taken from the flow controller shows a few dips in the differential line, but no rises. The dips occur when the pressure in the city line builds up to a point where the control valve has opened wide in an attempt to maintain the differential constant. This installation is an excellent example of the proper combination of pressure regulators and a flow controller to obtain constant flow and pressures.

Another problem encountered in low pressure gas distribution is the maintaining of the minimum pressure in the mains as required by the customer's appliances. A variable pressure will result in a variable heat output from any given burner or appliance, and this in turn would require that the customer continually adjust his fires. From the gas company's standpoint, it is desirable to carry the minimum pressure in order to decrease leakage loss from the system. It is not sufficient merely to have pressure reducing regulators maintaining constant pressure,

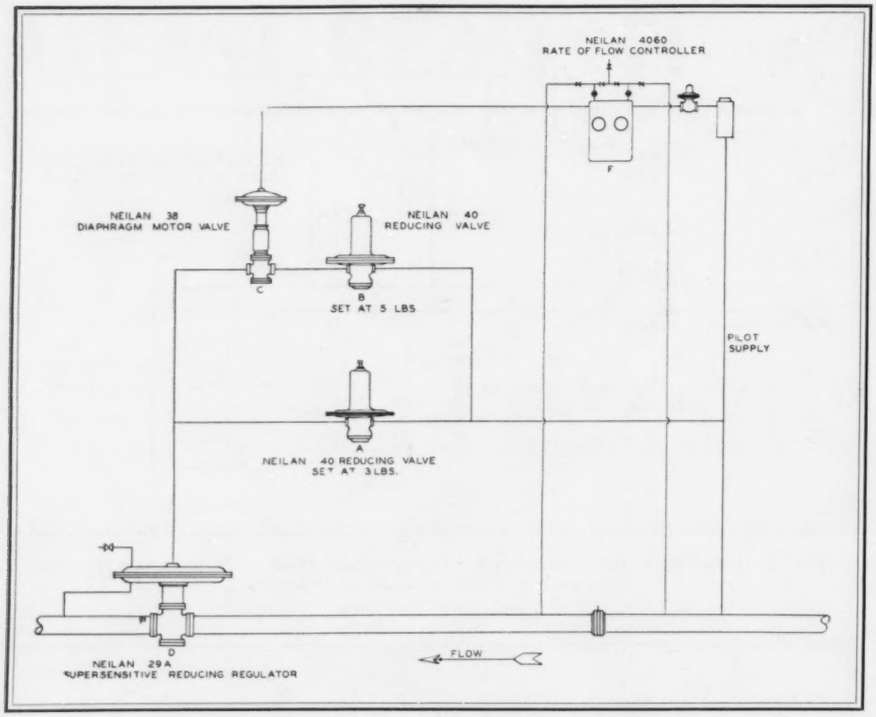


Fig. 4. Automatic booster system.

for as the load increases the friction drop also increases. If the pressure at some point upstream from the consumer's take-off is held constant, then as the load increases the pressure at the take-off point must drop. To overcome this condition, pressure booster systems are installed which automatically increase the high-side pressure as the load increases. A simple application of the booster system is shown in Fig. 4. Valve D is the main regulator, A and B are auxiliary pilot valves, C is a diaphragm motor valve, and F is the differential controller or booster. For normal loads, Valve C is closed, and the pilot A will cause the main regulator to hold a constant reduced pressure in the line. As the load increases, the differential across the orifice plate will also increase, and when it reaches a predetermined value, the booster controller will open valve C. The pilot valve B is set at a higher pressure than Pilot A, so when C opens pilot A closes. Pilot B now causes the main regulator to hold a higher pressure in the line until such time as the differential decreases to the original trip point. The booster control will then close valve C, and pilot A again starts controlling to hold the lower reduced pressure.

The foregoing examples of automatic control of flows and pressures have been taken at random from the engineering files; they represent only a few of the many specialized applications of control which have been worked out for the gas industry.

Pyrometry and Chart Computation Discussed

FOLLOWING their monthly dinner on September 22 at the English Tavern, Whittier, Calif., members of the Southern California Meter Association listened to a well-balanced program, introduced by a paper from S. F. Godfrey, Brown Instrument Co. on the subject of "Principles and Applications of Pyrometry". A selection of slides, illustrating the construction of pyrometric apparatus, and numerous uses to which it is put, added interest to Mr. Godfrey's presentation.

"Accuracy of Orifice Meter Chart Computations" was the topic of the paper by C. D. Martin, Southern California Gas Co., which concluded the program. General discussion of chart-reading experiences of companies represented at the meeting followed the paper. Both papers given at the September meeting will be published in *Western Gas*.

Announcement of golf tournament results for August was made by A. E. DeBurn, and the S. C. M. A.-*Western Gas* Goodfellowship Trophy turned over to George Christian of the Pacific Meter Works, winner of the August tourney.

Tennis-playing members of the S. C. M. A. are giving thought to starting regular competition within the Association, B. G. Williams of the Southern California Gas Co. being named chairman of a committee to work up plans in this connection.

Annual Pep Meeting

At the September meeting President L. P. W. DesBrisay called attention to the annual "Pep Meeting" to be held Thursday night, September 29, at the Los Angeles Gas and Electric Corp.'s Ramirez St. plant. The meeting, which is an annual event, was shared in by all past officers and committeemen, as well as others interested. After an excellent Dutch lunch, an informal discussion of plans for the current year's Association activity was held. M. J. Cereghino, chairman of the Association's Program Committee, presided over the meeting.

Fall Heating Campaign By Pacific Gas and Electric Co.

PACIFIC Gas and Electric Co., San Francisco, began a Fall Domestic Gas Heating Campaign on September 12 and will continue this campaign to December 10, inclusive. Down payment of 10 per cent will be required during the period, the balance payable in 12 equal monthly payments. If the total installed price of the heating installation is in excess of $200, 18 months may be allowed on the balance. These terms apply to all heating appliances listed by the company.

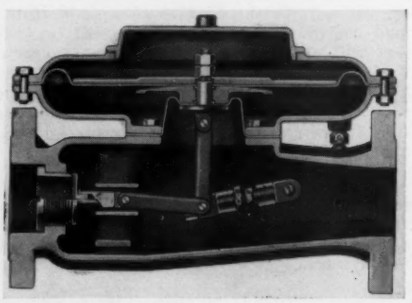
Special awards will be presented to crew captains whose crew attains 100 per cent accomplishment for the total campaign period. The five high salesmen in signed revenue at the end of the campaign period will be presented with merchandise orders representing a value of approximately $15. Salesmen's individual revenue accomplishment will be awarded with a $10 merchandise award for each salesman having $900 signed revenue to his credit as of October 21. Another award of $10 value will be given to each salesman having $1,900 revenue credit as of December 2. Special inter-crew prizes will be announced as the campaign progresses, the value being $15.

Manufacturer's direct-by-mail literature on gas heating appliances will be used for mailing to consumers.

Reynolds Announces Model 30 Flanged Type Regulator

THE new model 30, flanged type, high pressure regulator is announced by Reynolds Gas Regulator Co. and is supplied in either 2x2-inch, 2x3-inch or 3x3-inch connections, complete with companion flanges. The toggle levers are made from stainless steel, with the exception of the back link which is made from bronze.

Model 30 is flanged type, and has a removable valve pocket which may be taken out through the side hand-hole plate when it is necessary to renew the valve seat. It is



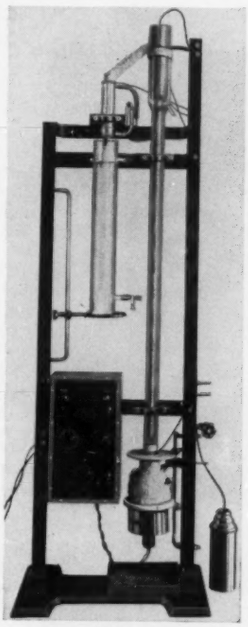
furnished with a removable orifice which is made of brass. This orifice is supplied in various sizes.

A small diaphragm under the center of the main diaphragm prevents the gas from having access to the main diaphragm until it is stream-lined in the outlet throat, increasing the capacity of the regulator. This also permits round-the-corner control, or remote control, if desired. The body of the regulator is designed so that when the gas leaves the face of the orifice it is released and streamlined through the body.

Model 30 will operate on inlet pressures up to 150 pounds, and is arranged for regulation of pressure to inches, ounces or pounds, according to conditions. It is built in either spring or dead-weight types.

Podbielniak Fractional Distillation Analysis Apparatus

THE Podbielniak Analytical and Research Laboratories announce the development of Models B and C in the Podbielniak line of high temperature fractional distillation analysis apparatus. The new apparatus is designed for the analysis of absorption oils, motor fuels, petroleum crudes, commercial solvents, light oils and similar complex liquid mixtures by fractional distillation. Model B has provisions for a complete range for vacuum distillations from 1,000 mm. down to 1.0 mm., and Model C can be used only for atmospheric distillation.



Model "C"

The apparatus is claimed to give sharp fractionation results, separating compounds boiling as little as 5° C. apart. Its distillation range is given as —180° C. to 500° C. (Temperatures above 300° C are corrected from vacuum distillation to atmospheric pressure) for Model B and —180° C. to 300° C. for Model C. A two-part fractionating column is used with a variety of interchangeable distilling tubes used with standard sleeve-type vacuum jacket.

New models of sample containers for sampling of gases and volatile liquids, of approximate capacity of 5 gallons and 1.5 gallons for the gas and gasoline types respectively, are also announced.

Gas and Gasoline Sample Containers

The Podbielniak "Packless Leak-proof Valves," another recent development, replaces the usual valve stem packing with a metallic soldered-on bellows.

Another addition to the Podbielniak line is an electromagnet valve for use with laboratory apparatus. The valve is sealed with a metal wall from the electromagnet proper and from the exterior. The needle is of steel in a brass seat.

A 12-page circular, No. 7, and a 16-page price list, No. 70, describing the above and other apparatus, have been issued by the Podbielniak Analytical and Research Laboratories, which are newly located at 112 N. Lansing St., Tulsa.

CORRECTED HEATING VALUE IN BRITISH THERMAL UNITS PER CUBIC FOOT
Cubic Feet of Gas Burned
Pounds of Water Passed
Temperature Deg. Fahr. of Metered Gas
Barometer Reading

U. G. I. Heating Value Computer in Slide Rule Form

THE U. G. I Gas Heating Value Computer for use with gas calorimeter, is now made in the form of a slide rule, with a range of from 300 to 1300 B.t.u. per cubic foot, which will meet the requirements of both manufactured and natural gas. This instrument is easy to operate, mechanically accurate and constructed to give long service. Size is 16 inches long and 2½ inches wide.

The U. G. I. Gas Heating Value Computer is being marketed by The U. G. I. Contracting Co. division of United Engineers and Constructors, Inc., Philadelphia.

Gas Appliance Society Tells Fall Sales Plans

THE most extensive fall campaign in the history of the Gas Appliance Society was announced at a enthusiastic dinner-conference held by that organization in the Palace Hotel, San Francisco, the night of August 16, and attended by nearly 300 leaders of the gas industry in California.

O. C. Bunster, state president of the Society presided. Among the speakers taking part in the program were P. M. Downing, vice-president and general manager, Pacific Gas and Electric Co.; L. J. Breuner, vice-president, John Breuner Co.; R. E. Fisher, vice-president in charge of sales, Pacific Gas and Electric Co.; C. B. Babcock, president, C. B. Babcock Co.; G. P. Egleston, general manager, H. R. Basford Co., and vice-president, Gas Appliance Society of California, B. W. Reynolds, dealer representative, Pacific Gas and Electric Co.

The meeting was opened by a brief address by Mr. Downing who stressed the value of the Gas Appliance Society as an aid in solving the common problems brought about by general business conditions of today.

L. J. Breuner reviewed some of the activities of the society, mentioning also plans for the coming months which were later reviewed in detail by B. W. Reynolds.

R. E. Fisher in a strong talk gave some of the background of his company's dealer co-operative support, stating that the Pacific Gas and Electric Co. was the first utility in the United States to endorse the dealer co-operative movement. Mr. Fisher predicted that the year 1933 will bring more effort than ever before in the cooperative sales plans now getting under way.

The history of the Gas Appliance Society since its organization in 1921 was traced by Mr. Babcock. Mr. Babcock stated that Mr. Fisher is credited with the conception of the idea for the Society, and with the assistance of George Egleston, H. M. Crawford, and Harry Jackson, worked out the details of the organization, naming Mr. Egleston as the first president and Frank Talcott as the first secretary.

The following figures were given by Mr. Babcock in discussing the benefit that the society has been during its lifetime: In 1923 there were 104 pages of newspaper advertising and publicity in the territory due to the efforts of the organization. In 1927 this was increased to 1,500 pages. In 1923 there were $468,000 in gas appliances sold in the territory. In 1928 through the efforts of the society, $6,000,000 worth of gas appliances were sold, while 1931 was the best year in the Society's history.

Advertising plans of the Society for the remainder of 1932, were outlined by Mr. Reynolds. The plan has been divided into two campaigns, the first being the gas range campaign, financed by the "Sticker Plan," whereby the distributor, retailer and utility each contribute an equal amount into a special fund used entirely for advertising. The feature of the gas range campaign is to be a striking billboard design, which will be displayed through Northern and Central California beginning October 1. Dealers are being urged to tie-in with this campaign with store advertising, window displays, and any other merchandising means at their disposal.

The second campaign, according to Mr. Reynolds, will be devoted to heating and will be financed by the general fund of the Gas Appliance Society. This campaign will tie-in with the Pacific Gas and Electric Co.'s expenditure of approximately $33,000 during October and November. The Gas Appliance Society's efforts will be devoted to the preparation of dealer helps, including two attention-getting display cards, bill stickers, and a salesman's handbook on selling circulating heaters. The heating campaign is also scheduled to begin on October 1.

American Meter Co. Acquires Westcott & Greis, Inc.

Announcement has been made by American Meter Co., Inc., of the acquisition of Westcott & Greis, Inc., for many years sales agent for American Meter Co. products in the Mid-Continent field with headquarters at Tulsa, Okla. The present sales service located at Tulsa, Dallas and Houston will be continued and no changes in personnel are contemplated. The control of Westcott & Greis by American Meter Co. is a further step in completely integrating this company's sales organization under centralized management.

Three Texas Towns Scheduled for Service from Coleman Field

A proposal to furnish gas to Eden, Texas, from four of their wells in Coleman county has been made by B. J. Pittman and F. B. Spence, DeLeon oil operators. The same line would also serve Paint Rock and Millersview. One of the wells is the largest gasser in Coleman County.

Fuller With Binckley Laboratories

E. S. Fuller, formerly utility engineer for the Union Oil Co. of California at the Wilmington refinery, became associated with the Col. George Sydney Binckley laboratories, Los Angeles, as sales engineer.

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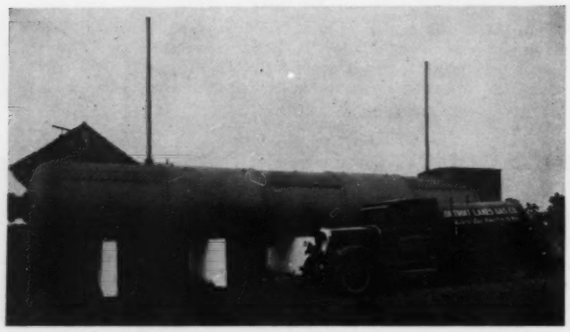
BUTANE - PROPANE NEWS

Covering Liquefied Petroleum Gas Service



Distribution of Bottled Gas on a Public Utility Basis

By H. H. HENLEY,

Engineer
Liquefied Natural Gas Corporation
Minneapolis, Minnesota

Fig. 1. Above left. Typical storage and plant.

Fig. 2. Above, right. Typical alley installation

Fig. 3. At right. Typical curb installation.

TWENTY years ago the small community was suffering for the lack of adequate electric service. Engineers and utility men who were awake to the situation realized that there was a big field for the development of the electric light and power industry in the small communities which had been neglected due to the lack of efficient methods, so as to be able to deliver electric service in these small communities at reasonable rates and at a profit. The transmission line and the interconnecting of small communities solved this question and today there are very few of the smaller communities that do not enjoy good electric service at reasonable rates.

It appears today that the small community is in the same position in respect to modern, adequate gas service, at reasonable rates, as it was in respect to electric service 20 years ago, except that there are many more small communities without gas service today than were without electric service 20 years ago.

Gas service "beyond the mains" has been supplied in a limited degree in the small communities and rural districts on the adopted conventional basis of the one- or two-drum system of "bottle gas" distribution. This has delivered gas to thousands of homes and commercial users, but it has been done largely on a merchandising basis. That is, individual contracts have been made under many different plans for selling propane gas to the consumer by the pound, or in most instances by the "bottle."

For more than half a century the public has been educated to purchase certain commodities on a public utility basis. They are accustomed to buying light and power from the electric company, water from the water company, gas from the gas company and telephone service from the telephone company. The public has been educated to buy gas, electric and water service through a meter—electricity by the kilowatt hour, water by the 1000 gallons, and gas by the 1000 cubic feet. The consuming public like to compare the rates of their public utility service of any kind that they are receiving with that of another community. It is hard to explain to the layman the price of gas by the pound or by the therm, or by "bottle units" when their neighboring larger city is buying gas by the 1000 cubic feet.

Late in 1929 when butane-air gas systems were providing gas service on a public utility basis to towns of 2500 population and larger it became evident to the writer that there was a much greater demand in many more communities for gas service on a public utility basis in the smaller communities.

It was determined that it was practical and economical to distribute undiluted propane gas in mains to the smaller communities within certain limits.

In 1930 the writer designed and established an undiluted propane system in Wahpeton, North Dakota. This plant was built in the simplest form, consisting of a 12,500 gallon propane storage tank, a small valve house containing pressure regulators, master meter, heat exchanger and air compressor for unloading propane. The distributing system was an all butt-welded, steel pipe job, covering the entire city. Gas was metered to the customer by direct reading meters, in cubic feet, undiluted. The rate schedule

was based on 530 B.t.u. equivalent and for the application of the rates the meter readings were multiplied by 4.8. Immediately upon the completion of this plant an identical system was designed and built at Detroit Lakes, Minnesota, and at this time it was determined that the investment of the company in the storage and unloading facilities should be used for a dual purpose as an economy. It should become not only the gas plant for Detroit Lakes but the bulk station for the delivery of propane gas to the adjacent territory by truck.

Fig. 1 shows the storage tank of the Detroit Lakes Gas Co. and the type of service truck used in delivering propane gas to the adjacent territory. By a system of valves on the truck, the pumps, which are geared to the transmission, either load or unload the truck through the same flexible hose connection that is used to fill the customer's underground tanks in the smaller communities. The small tile roof building shown by the storage tank contains the lower step pressure regulators, master meter, heat exchanger and air compressor for unloading purposes. The governor shown on top of the storage tank reduces the tank pressure to 30 pounds. By experiment it was determined that the best results were obtained by making the first reduction of pressure directly upon the gas leaving the storage tank, so as to avoid the possibility of any gas liquefying on account of the lower temperatures encountered when conducting the vapor through pipes located underground.

The method of selling this service to the adjoining communities was simple. The village authorities were told that they could have the same gas, from the same tank, through the same kind of a meter, and at the same rates as those prevailing in Detroit Lakes. The small towns appreciated this immediately because they were used to being discriminated against in the matter of rates and service as against the larger or county seat town. They were told that the only contingency as to their receiving service in any part of their village was that the company be guaranteed that over some period of time each consumer would use $250 worth of gas. This guarantee was to be made by each consumer by depositing $50, which deposit is rebated to the customer on the basis of 20 per cent of his monthly gas bill.

The public quickly saw the justice of this guarantee and the company was able to obtain 20-year franchises from these small communities, to use the streets and alleys for interconnection purposes, or for the burying of tanks, and the right to collect the $50 deposit.

Fig. 2 shows the method in an extreme case where one customer is served from an individual unit. Three sizes of tanks are used as standard, being of a capacity of 100, 200 and 500 pounds of propane, respectively. The size of tank installed is determined by the customer's requirements or the number of customers to be connected from one tank. Each tank is installed under a manhole ring and cover, in either the alley or the street, and so located in alignment that when business justifies, the service connections to the customers' premises may be inter-connected by merely removing the manhole ring and cover, and tank, which can be reinstalled in another isolated district. The tanks are of a capacity meant to contain six weeks supply for the customers served.

Each individual tank, regardless of size, is equipped with two ¾-inch packless, angle valves, with P.O.L. ground joint connection. One of these valves is used for the connection for filling by truck each month.

SCAIFE

I. C. C. CYLINDERS

A majority of distributors of Liquefied Petroleum Gas now use the Scaife cylinder.

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GROBLE GAS REGULATOR COMPANY

Office and Factory: Anderson, Indiana

The other valve connects to the pressure regulator, mercury seal and service. The small valve with thumb-screw top, shown between the packless valves, is a ¼-inch packless valve, with 1/32-inch angle orifice. On the inside of the tank a ⅛-inch pipe eduction tube is inserted in this valve, of the proper length according to the loading density and size of the tank, so that when the tank is filled monthly this eduction tube and small packless valve become a test valve or gauge to determine when the tank is filled with liquid to its proper loading density. All valves, the governor and mercury seal, are housed under the manhole cover. The manhole ring is 14 inches high, which provides the required clearance.

A truck loaded at the gas plant, or bulk station, in the "key" town proceeds to each of the adjacent towns monthly. The truck driver is a gas man. He removes the manhole cover, fills the tank, reads the customer's meter and makes any necessary appliance adjustments at one time, on his monthly trip.

Fig. 3 shows a typical boulevard installation and the method of monthly service by truck.

In a three months period, under this plan, the Detroit Lakes Gas Co. obtained franchises, and enough customers to pay to visit the town monthly by truck, in 25 towns within a radius of approximately 50 miles.

Exhaustive tests have been made that demonstrate positively that there is sufficient latent heat in the ground, even in extremely cold weather, to vaporize the gas several times faster than is required, even in the larger installations.

This plan of operation has been presented to the Railroad Commission of the State of North Dakota, so as to ascertain whether or not the North Dakota Commission would assume jurisdiction over this type of operation and consider it a public utility and grant exclusive convenience and necessity certificates for its operation. The North Dakota Commission ruled that under this basis it was a public utility and they would assume jurisdiction and grant exclusive convenience and necessity certificates.

In all these towns, due to the fact that the company serving them with gas has a franchise for operating a gas system in their town, and is selling them gas through a meter, the customers feel that they are receiving a regular public utility service and from their viewpoint it makes no difference whether they are receiving their service from a main, an individual tank in the alley, or by an inter-connected group from a tank. The servicing of these group installations and individual tanks on a monthly basis by truck is highly economical and with the very minimum of investment. This type of service has gone through one northwestern winter in Northern Minnesota and has presented no difficult engineering or servicing problems.

Liquefied Natural Gas Corp. is obtaining franchises in a group of towns in Minnesota, to serve undiluted propane gas on the above method, except that should a small town or village refuse to grant the company a 20-year franchise for the use of its streets and alleys for interconnection purposes, the monthly service charge of 75c per customer is raised to $1.00, to cover the increased investment and cost of service caused by not being allowed to inter-connect customers from one or more tanks.

The rate schedule for "bottle gas service on a utility basis" being offered in those towns which grant 20-year franchises is as follows:

Monthly Service Charge.....75c

Plus Gas Consumed Per Month as follows:

1st	1000 cu. ft. used per month.....	$1.75
2nd	1000 cu. ft. used per month.....	1.50
3rd	1000 cu. ft. used per month.....	1.25
Over	3000 cu. ft. used per month.....	1.00 per M.c.f.

Minimum charge 75c per month.

American Liquid Gas Co. Formed in Los Angeles to Sell "Algas"

The American Liquid Gas Co., 322 Transamerica Building, Los Angeles, Calif., has been formed to distribute liquefied petroleum gas for industrial use under the trade name of "Algas". The company will also act in an industrial engineering capacity. Harold W. Smith and Colman O'Shea are affiliated in the company. Mr. Smith was formerly with the General Petroleum Co.

White Star Refining Co. Now Making Propane and Butane

White Star Refining Co., Detroit, Mich., a division of the Vacuum Oil Co. is producing propane and butane as a by-product of its stabilization plant at Trenton, Mich. At present the output is approximately 2,500 gallons per day. The company plans to contract with dealers for filling of cylinders, according to Andrew Carnegie of the engineering department.

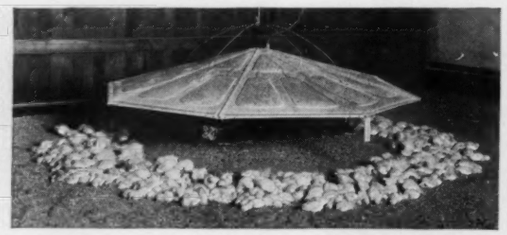
Suburban Gas Co. Moves Offices

Suburban Gas Co. has moved its headquarters from Belleville, N. J., to Verona, to be nearer the center of company operations.

GAS BROODERS

Are you getting your share of the vast potential fuel load for the brooding of baby chicks and turkeys? Gas when used with the Hart Brooder is by far the best and most economical means of brooding. The Hart Co. are pioneers in the manufacturing of gas brooders, having sold on the Pacific Coast more than any other make. Many gas companies are substantially increasing their sales by handling the Hart Brooder line. One average poultryman when brooding consumes several times as much gas as the ordinary household user.

Send at once for descriptive literature, prices, discounts, etc., on our complete line of thermostatically controlled brooders.



Flashlight photograph of chicks sleeping under a Hart Gas Brooder at the world's largest poultry ranch where Hart Brooders are used exclusively. One hundred and forty-four brooders in operation the year round brooding a thousand chicks to the brooder.

H. W. HART MFG. CO., P. O. Box 404, W. Santa Monica, Calif.

FISHER TRADE MARK

Use Fisher Gas Pressure Regulators for All Gas Service

Butane, Propane, Natural and Artificial Gas and for All Pressure Conditions

◆

FISHER GOVERNOR CO.

201 South First Ave. MARSHALLTOWN, IOWA

1015 Santa Fe Ave. LOS ANGELES, CALIF.

KEROTEST tested and proved FORGED BRASS VALVES, MANIFOLDS and FITTINGS for PROPANE BOTTLED GAS SERVICE

Write for descriptive circular

KEROTEST MFG. CO.

PITTSBURGH, PA.

KEROTEST

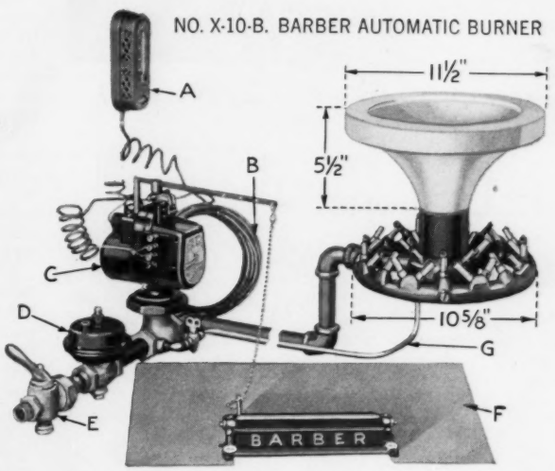
A Sensational Evolution in Gas Conversion Burners

An Improved Quality Burner With Unequaled Price Appeal— One That Develops Satisfied Gas House Heating Customers. Dependable, Efficient, Economical for Fall, Winter and Spring—

TEN IMPORTANT REASONS

Noiseless
Will Not Back-fire
Scientifically Built
Requires No Servicing
No Air Mixer Adjustment
Will Not Deposit Carbon
Quickly and Easily Installed
Develops 1900° Flame Temperature
For Furnaces and Boilers Up to 22"
Made to Convince Hesitant Prospects

NO. X-10-B. BARBER AUTOMATIC BURNER



NOTE THESE FEATURES

(A) No. 4010 Minneapolis Plain Thermostat.
(B) 25 feet of Insulated three cable wire for connecting thermostat.
(C) No. B-2210 Minneapolis Motor Valve.
(D) Barber Gas Pressure Regulator.
(E) ¾" A.G.A. Lever Handle Valve with Union.
(F) Butterfly Draft Door with Special Lift Assembly.
(G) Individual Pilot. Completely Assembled.

NOW there is a demand for NEW Manual and Automatic Controlled Gas Conversion Burners by Gas Companies, Gas Appliance Merchandisers and Heating Contractors—for five, six and seven room homes—that could be sold and installed at a moderate price and still prove durable, efficient, economical.

Barber Engineers have developed a high grade line of No. X-10 Burners to meet this demand—in FIVE models—from the Manual Control type to the completely Automatic with Safety Pilot Control, in an amazing low price range, to meet sales resistance of all classes of hesitant prospects.

No. X-10 Barber Burners are not the cheapest on the market, even though they are priced amazingly low—but they can be installed in less time and at less expense than any Conversion Burner on the market, which is a big factor in the initial cost to the home owner. They are NOT only for Spring and Fall heating, but for the entire Winter—year after year.

They are made of the best materials—at prices in keeping with DEPRESSION times. They provide a means of supplying Gas Heat, Comfort and Convenience—for average five, six and seven room homes for installation in the present Furnace or Boiler—without removing grates. The New Barber No. X-10 Burners do more—they actually prevent high gas bill complaints caused by uneven or fluctuating gas pressures, whether of the Manual Control or Automatic types.

Progressive Gas Companies, Gas Appliance Merchandisers and Heating Contractors can develop a large and profitable business upon these New No. X-10 Burners, if they will connect up in their show or display rooms, for Demonstration with Gas, No. X-10-M and No. X-10-B Burners—so that their customers may be shown their actual merits.

Check up on the component parts of these new Barber Gas Conversion Burners to convince yourself that they have real merit—and contain the essential features to produce efficient and economical GAS HEAT—without waste.

Our new, liberal and attractive stock quantity discounts, together with our Sales Helps will be sent immediately upon request. Write us without delay.

THE BARBER GAS BURNER COMPANY

3702-04 SUPERIOR AVENUE CLEVELAND, OHIO

Classroom instruction in the automotive course under E. C. Wood, superintendent of transportation for Pacific Gas and Electric Co.

Pacific Service Educational Program

DURING the first six months of 1932 the Pacific Service Employees Association of the Pacific Gas and Electric Co., San Francisco, Calif., issued 1253 certificates of scholarship in courses dealing with gas, electricity, automotive science, steam hydraulics, naturalization, sales, mathematics, accounting, English and public speaking. A quota of 565 certificates had been set by the educational committee of the association at the first of the year, the number actually given exceeding that quota by 221.8 per cent.

Many interesting courses of study in the subjects named are being offered to employees of the company through the work of the association, which is composed entirely of P. G. and E. personnel. Its activities over a period of years has helped materially in the advancement of general and technical education within the ranks of the organization.

Since the company's field of operations extends over a wide area of Central and Northern California, the territory is divided into geographical sections, all sections carrying on courses simultaneously. Provision also is made for correspondence instruction. Meetings generally are held weekly, immediately after working hours or in the early evening, lasting an hour and a half. Courses are arranged to be covered in from 12 to 16 weeks.

As a rule, class leaders are chosen from among supervising employees, but when it is considered advisable, an instructor is employed, the students sharing the expense of salary. Leaders are given a free hand in developing their own teaching methods, being guided in general procedure by the teaching manual of the Association.

In courses such as the automotive, and the different classes in various phases of the generation and distribution of electricity, studies are carried on in the shops of the company under supervision of engineers and technicials. Here, augmenting their textbook studies, students gain first hand knowledge of the equipment. In this way the gulf between theory and practice is bridged and knowledge gained in classes is put to immediate practical use.

Courses in English are offered for stenographers and other office workers, with special English and letter writing classes for dictators and executives. An English professor is employed to conduct these classes. Classes in public speaking also have proved highly popular among both men and women.

Domestic science classes give the girls of the company a chance to learn the fine art of cooking. Here also they become familiar with the purpose and operation of modern household appliances.

Public Ownership Data Branded False

FOLLOWING repeated misstatements disseminated by the Public Ownership League of America, based on the alleged success of municipal ownership in Oklahoma, Edward F. McKay, manager of the Oklahoma Utilities Association, brands the statements in question as gross falsifications and backs up his charges with proof from city and state official records.

Attention of the secretary of the Public Ownership League, Carl D. Thompson, has repeatedly been called to these misstatements by the Oklahoma Utilities Association, but except for formal acknowledgement, the corrections were ignored, until in Leaflet No. 7, published by the League, most of the former misstatements were compiled into a single broadside and reproclaimed. The misinformation contained in the leaflet was picked up by news organizations and special writers and broadcast throughout the country.

Effectually disproving the representations of the Public Ownership League with data in each and every case taken from official city and state records, Mr. McKay introduces the following exhibits:

(1) That among the 55 Oklahoma towns included in the 68 listed by the Public Ownership League in Leaflet No. 7 there were 18 with general city taxes and therefore not "tax-free" on the basis set forth in Leaflet No. 7 or any other basis.

(2) That of these 55 towns in Oklahoma, 20 had utility company electric service, and no municipal utility service except water, our exhibit giving in each instance the name of the utility company serving the town.

(3) That Oklahoma had, in fact, 81 cities and towns without a general city tax, 42 of which had no municipal utility service except water, proving conclusively that omission of a general city tax, where in fact omitted, should not be credited to municipal utility operation.

(4) That the average monthly net bill for 50 k.w.h. of electricity in all Oklahoma towns with municipal electric plants was $4.95, compared with $4.12 in utility company served towns of nearest the same population according to the 1930 census; or 83 cents higher in the municipal plant towns than in those with company service.

(5) That the average net bill for 50 k.w.h. of electricity in all Oklahoma towns with municipal electric distribution (buying current wholesale from utility companies) was $5.56 compared with $4.29 in utility company served towns of nearest the same population; or $1.27 higher in the municipal distribution towns than in those with company distribution.

(6) That the average net bill for 50 k.w.h. of electricity in all Oklahoma towns with municipal plant or municipal distribution (the two groups combined), was $5.24, compared with $4.20 in towns with utility company service only (neither municipal plant nor municipal distribution) of nearest the same population; or $1.04 higher in the municipally served than in the company-served group.

(7) That the average net rate for 5,000 cubic feet of natural gas (there is no other in Oklahoma) in Oklahoma towns with municipal gas service is 53 cents per M cubic feet, compared with 44.7 cents per M cubic feet in utility company served towns of nearest the same population; or 8.3 cents higher in the municipally served than in the company served towns.

(8) That public utility electric and gas companies of Oklahoma, in addition to affording their customers important rate advantages, also pay substantial amounts in taxes in their respective taxing jurisdictions, while municipal utility properties of any and all kinds escape any and all taxes.

Kifer Resigns Post With San Antonio Public Service

E. H. Kifer, vice-president and general manager of the San Antonio Public Service Co., San Antonio, Texas, for the past 15 years, left that post on October 1 to become president of the Muskegon Gas Co., Muskegon, Mich. He will also be associated with the executive staff of the American Light & Traction Co., Chicago, holding company for both the Muskegon utility and the San Antonio company.

Mr. Kifer went to San Antonio in 1918 as vice-president and general manager of San Antonio utility, serving in that capacity until this time. Before accepting that position he was vice-president and general manager of the Binghampton Gas Co., Binghampton, N. Y., and previous to that time was with the Madison Gas and Electric Co., Madison, Wis., which is also a subsidiary of American Light and Traction. Natural gas was piped to San Antonio and the change-over made during his period of service there.

Plan Gas Transmission Line to Take New Fuel to McCook, Neb.

Kansas Pipe Line & Gas Co., Salina, Kan., has a contract with Central States Electric Co. of Cedar Rapids to supply gas to the Citizens Gas Co., a subsidiary now serving manufactured gas at McCook, Neb. Construction of a line to serve the town will probably begin in the Spring of 1933.

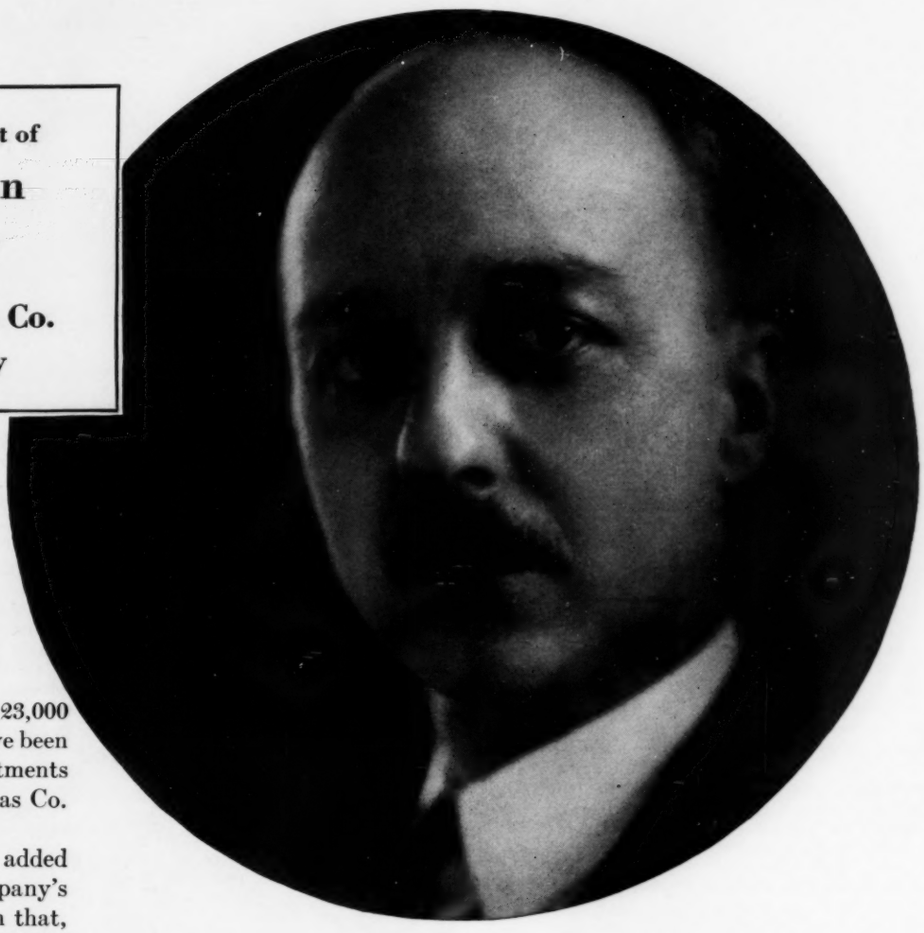
"The SUCCESS of ELECTROLUX in popularizing the use of gas as a modern fuel is second only to the veteran achievement of the gas range"

This is the statement of

N. T. Sellman

Director of Sales and Utilization

Consolidated Gas Co. New York City



A tiny gas flame makes constant and steady cold

IN FIVE short years, over 123,000 Electrolux refrigerators have been installed in homes and apartments served by the Consolidated Gas Co. of New York!

Not only has Electrolux added over 184,000 MCF to this company's monthly load. But more than that, because Electrolux is so outstandingly modern, it has popularized the up-to-dateness of gas as fuel in this community. Has given a big impetus to the sale of all gas-using appliances.

The success of Electrolux in New York City is not a local phenomenon. It is *a national trend*, for which there are two vital reasons:

First, Electrolux offers home-owners and building operators the very last word in carefree, dependable, money-saving refrigeration.

Second, astute gas executives everywhere have been quick to grasp the significance of Electrolux as a keystone in the appeal of the All-Gas Kitchen. They have appreciated the strong desirability of merchandising and selling Electrolux with the whole strength of their organization behind it.

To assist gas companies in closing profitable Electrolux sales in their territories, we have prepared a series of valuable sales booklets. Write us for details. Electrolux Refrigerator Sales, Inc., Evansville, Indiana.

ELECTROLUX

THE *Gas* REFRIGERATOR

Adhesive Characteristics of Bitumens

(Continued from Page 18)

poured into the mold, filling it completely in the space a, b, c, d. The hot bitumen bonds to the plate surface (or to the primer on the plate) at a, b, and the combination is then set aside to cool. Later it is immersed for a period of one hour in water at the temperature required for the test—usually 25° C. (77° F.)

It is then mounted in the framework by screwing the cap F onto the mold to which the steel plate is held by the bitumen. Following this the spring attachment plug G is screwed into the back side of the disc as shown in the drawing. The apparatus is then ready for mounting in the Smith ductility machine, as shown in Fig. 2.

On starting the motor, part S (Fig. 1) moves out with the moving shelf to the middle stud of which it is hung by the hole R. The other part of the apparatus remains stationary, being attached to the middle stud of the fixed shelf of the ductilometer at hole T. The speed of the driving motor is so adjusted that the moving part of the machine will recede from the stationary part at a rate of 5 cms per minute (7). As the moving shelf advances, the spring becomes extended, tending to pull the plates away from the mold with a force which increases in magnitude until it exceeds the force of attraction between bitumen and plate. When this value is reached, the plate pulls away and strikes the surface P. Since the spring was calibrated with a known force, the reading on the ductilometer scale, which corresponds to the distance the moving shelf has advanced, gives the spring extension. The corresponding force is, with due regard for unavoidable inaccuracies, the value sought for adhesiveness of the particular bitumen to metal under the conditions of preparation.

Use of this apparatus in tests on a diversified list of pipe-coating bitumens discloses a number of advantageous qualities as well as several that are disadvantageous. Among the favorable qualities may be noted the fact that under ordinary conditions results may be duplicated within reasonably close limits, accuracy being dependent upon the care taken in preparation of the plate surface and in the handling of the bitumen. The principal disadvantage is that the field of applicability of this apparatus is practically limited to secondary bitumens which have little or no ductility at the normal working temperature; i. e., 77° F. This means that a number of relatively high-penetration, low-softening-point asphalts and coal-tar pitches that are sometimes used for coating pipe cannot be tested altogether satisfactorily with apparatus of this character. If the temperature is such that the ductility of the bitumen may be neglected, then the rate of application of load, while not perfectly uniform, will be the same for each specimen tested. Objection may be offered by some to the relatively small area of contact (1 cm^2) between bitumen and plate, but the work at the Bureau has not shown this to be a vital defect. Whether or not the test results obtained by the use of this instrument indicate the relative degree of bond between a bitumen and a curved pipe surface, can be determined only by extensive use of the instrument, checking the results against actual service.

It will be evident from examination of Fig. 2 that the horizontal manner of placement of this device may be the source of some inaccuracy in results because force is applied in a direction not strictly normal to the surface of the disc. The force actually applied is a resultant force of magnitude and direction determined by the magnitude and direction of the horizontal force exerted by the spring and magitude and direction of the resultant weight of a part of the spring plus that of parts by which it is attached to the plate. There is also some slight friction between the rounded edge of the disc and the two horizontal rods on which it rests.

The effect of these extrinsic forces is to bring into play a force-couple that, were it of sufficient magnitude, would tend to "peel" the plate away from the bitumen. However, for the practical purposes of this test (which is not to be regarded as of precision character) the extrinsic forces are small enough to be considered negligible in comparison with the force brought into play by the spring.

The Smith ductilometer was chosen as the means for actuating this apparatus because it is a standardized piece of laboratory equipment.

V. Observation on a Number of Pipe-Coating Bitumens

A number of distinct conditions not attributable to poor preparation are observable in use of the apparatus here described. When plate and mold separate under the stress of the spring the surface of the plate is observed to have a characteristic appearance for the particular bitumen under test. The following four conditions, marked A, B, C, and D, are distinctly recognizable*:

A. Adhesive force or bond greater than cohesive or tensile strength of bitumen. Secondary bitumen breaks but does not pull away cleanly from any part of interfacial area.

B. Adhesive force over only a part of interfacial area exceeds cohesive strength. Application of stress results in secondary bitumen separating cleanly from part of interfacial area, but leaving residual bitumen where the adhesive force exceeded the cohesive strength.

C. Adhesive force or bond less than cohesive strength of bitumen. Secondary bitumen separates cleanly over entire interfacial area.

D. Indeterminate bond under conditions of test. Secondary bitumen possesses sufficient ductility at the temperature of test to elongate under application of moderate stress.

In the column of Table No. 1 headed "Type of Separation" are recorded observations on a number of coating materials now on the market. The manufacturer's primer was used in each case in bonding the secondary bitumen.

It will be evident from examination of the values recorded for adhesiveness in Table No. 1 that these primers differ very markedly in their ability to hold the secondary coats.

The demonstrated variability in coating bitumens indicates that it will doubtless prove advantageous in the future to require that these materials meet adhesiveness standards. The question as to whether these standards shall be empirical in character along the lines of the four characteristic conditions cited above, or whether exact numerical values representing "adhesiveness" as determined on an instrument similar to the one herein described shall be set up, can only be settled after careful consideration of all controlling factors by the interests concerned.

*It is regretted that macro photographs illustrative of these conditions are not available at this time.

VI. Summary

1. The question of adhesion of bitumens used as pipe coatings is important for the reason that moisture pockets, removal of bitumen and in some cases deformation are not infrequently chargeable to poor bonding.

2. Bitumens can be bonded to metal if the metal is first heated to a temperature somewhat in excess of that of the bitumen, or they can be bonded in the conventional manner involving use of primers. Although bitumens bonded in the first way adhere with a strength which is usually greater than the tensile strength or ductile resistivity of the bitumen, it is not economically practicable to adopt this technique in the field. If a primer is used, it may not meet requirements for satisfactory bonding quality and must therefore be tested.

3. Adhesiveness tests have been made in the past largely through use of cumbersome hydraulic presses. An instrument which is adaptable to laboratory requirements has been worked on at the Bureau of Standards. This apparatus involves application by means of a spring of a slowly incremented force to effect separation of a steel plate from contact with bitumen contained in a specially designed brass mold. The adhesiveness apparatus has been designed for use with the Smith ductility machine—a device that is a standard piece of equipment in bituminous laboratories, and has the advantage of providing in a compact arrangement the slow movement needed for actuation of the adhesive meter.

4. Application of the adhesive meter to 12 different bituminous pipe coating materials shows that considerable variation in adhesive qualities exists. Values ranging from 27.9 to 268.0 pounds per square inch were found.

5. Bitumens separate from the steel plate of the adhesive meter in four distinct ways that may be identified as A, B, C, and D, according to whether the bitumen separates cleanly from the metal, sticks with a tenacity greater than the cohesive strength of the bitumen or exhibits intermediate characteristics. For purposes of rating, bitumens may be placed in one or another of these categories and accepted or rejected accordingly, or they may be rated with numerical values corresponding to the "adhesiveness" in pounds per square inch as measured in an adhesive meter of the type described in the paper.

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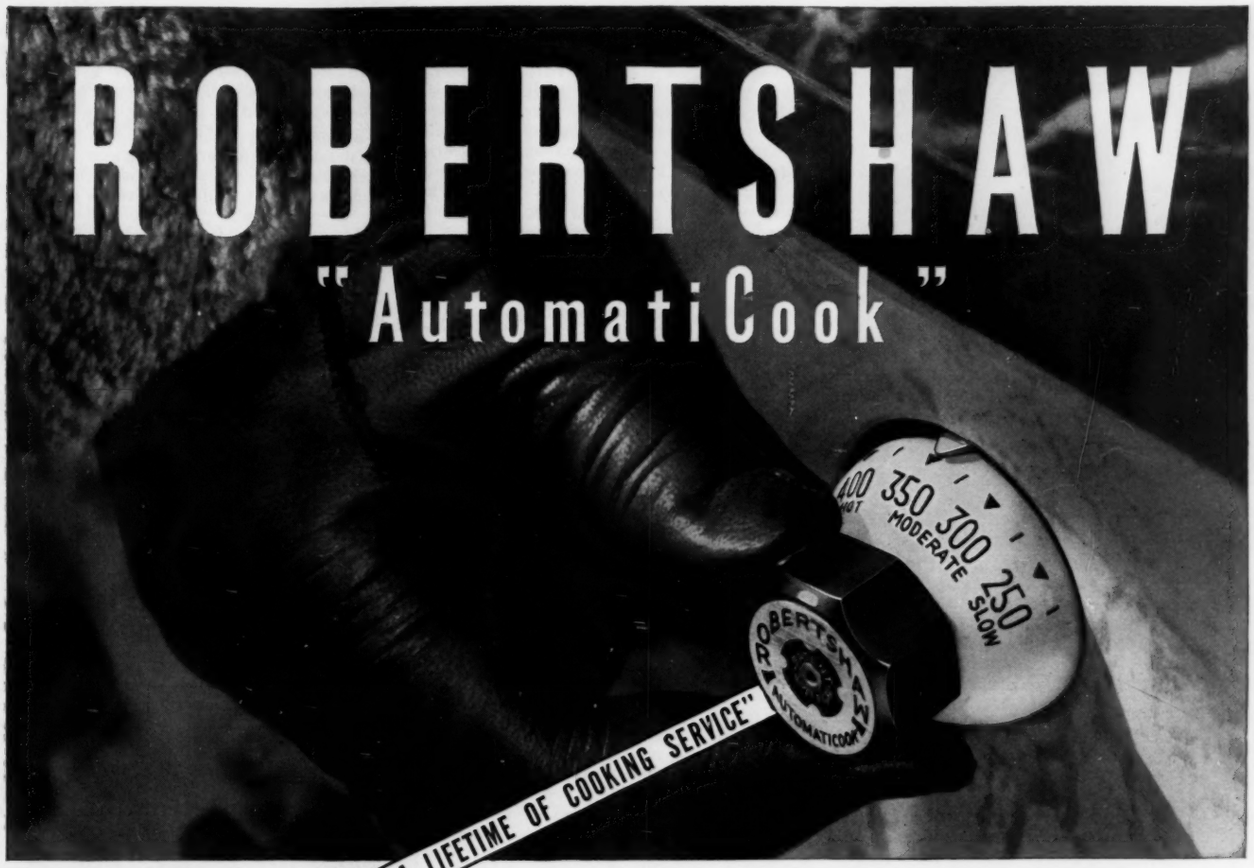
6. Fraas, Dr. Ing. Asphalt und Teer, Heft. 13, (1930). Eine Neue Methode zur Feststellung des Brechpunktes bituminoser Blindemittel und Bituminoser Massen.
7. This is the same rate as that which is the standard for ductility determinations of bitumens.



NEW MODEL "F" FOR TABLE TOP AND CONSOLE RANGES

MODEL "K" FOR CONSOLE RANGES

Win New Business with ROBERTSHAW

- And win it now!
- For more women are cooking their own meals than ever before.
- And when a woman does her own kitchen work, she rightfully feels that she should have a modern range, equipped to help her in every possible way.
- That means a Robertshaw . . . the cooking control she knows most about through years of advertising and the good reports of her friends.
- Dealers know this just as well as housewives . . . and they also know that it doesn't pay to handicap their selling work by trying to sell a range with a "just as good" oven control, no matter how alluring the price may seem.
- With over 150 Robertshaw equipped brands to choose from, you can always offer the last word in real value and have the selling help of the Robertshaw behind every range you sell.

The Robertshaw Lithographed Display will "dress up" your window or floor display. It's free . . . . write for it now.

ROBERTSHAW THERMOSTAT CO.
YOUNGWOOD · · PA.

The "O. N. G. News", company house and consumer news-sheet is published twice a month during the winter months. The cover page is usually illustrated with some phase of a large industrial consumers business.

Oklahoma Natural's Human Relations

(Continued from Page 23)

Christmas carols to raise money to buy food for needy families. A group was organized in the company for such work, and the singers were carried about the city for three nights in a company truck. Much money was collected and a material benefit for the needy was accomplished. Incidentally the company received favorable newspaper mention.

Oklahoma Natural display windows often have been loaned to clubs and organizations for various worthwhile projects. For the company's own uses, the windows are being dressed with a series of displays obtained from the American Gas Association.

Working with Dealers

Inasmuch as the Oklahoma statutes forbid the sale of appliances by utilities, the Oklahoma Natural endeavors to work at all times in the closest harmony with appliance dealers. Merchants are given space on the floor of each office for the display of appliances, with neat cardboard signs indicating to prospective purchasers where the particular appliance may be purchased.

Cooperative sales campaigns also have been conducted in several cities, the merchants and the company joining forces to increase gas appliance sales. The campaigns are preceded by a survey by members of the Oklahoma Natural sales department, the resultant lists of sales prospects being available to the dealers. Usually the campaign is opened with a special newspaper section of advertising and news articles. The company's service men and sales engineers are always available to any merchant or consumer for free service or consultation.

This extensive public benefit program is closely followed by President Olsen, who definitely adheres to the policy that a public utility is a public servant. In direct charge of this phase of company activity is Reid S. McBeth, assistant to the president, who also is responsible for the activities of the publicity and advertising department. George Goodale, former Tulsa newspaper man, aids Mr. McBeth in the detail work of publicity and advertising. Mr. McBeth is directly engaged in numerous activities having a bearing on public contracts. He has served as president of the Advertising Club of Tulsa and organized and is at present, chairman of the Better Business Bureau of Tulsa. Chairmanship of the publicity committee of the Tulsa Chamber of Commerce, and the Tulsa Community fund have been other duties. He is also a director of the Tulsa County chapter of the American Red Cross.

Making the Most Out of News

In obtaining publicity, it has been the policy not to attempt the use of "canned" propaganda. The newspapers are always supplied with news items concerning the company's activities.

Weather is always news. A Tulsa afternoon newspaper was given a one-column cut charting the weather hourly for 24 hours every day last winter and during the summer the company still furnishes the publication with temperature reports, although not in the illustrated form.

Stories are prepared on industries of the state which use natural gas. Pictures are also obtained and the newspapers invariably use these in their business page sections.

The various public benefits explained here have also been given publicity. Obtaining such publicity is doing only what the newspaper man is trained to do—to look for news and stay right on top of it.

The "O. N. G. News," as the company magazine is called, closely resembles a newspaper in type dress, although the size is 8½ by 11 inches. The cover page is highly illustrated, usually with a striking picture of some phase of an important industrial gas consumer's business. On an inside page is a story telling of this industrial concern. The magazine is not being published during the summer, but ordinarily is issued twice each month.

Several months ago the company decided to mark historical spots in the state, and a comprehensive map of Oklahoma showing these places was drawn by Harry Z. Sanders, the company's master draftsman. A Fourth of July travel story was built around the map —suggesting places to drive for the week end, and a Tulsa newspaper used the map and story as a full page feature. The map was reproduced in an eight column cut.

So much for publicity. It is far too full of details to attempt to describe because the methods of developing and presenting the news are not found in a set of rules.

Institutional Advertising

Oklahoma Natural's institutional advertising stresses dependable service and the necessity of great investment and interconnected systems. An unusual series of advertisements was run last winter with effective results. For answering complaints, a character called "Gassy Bill" was used. Bill was the home-loving codger who always had ideas and never hesitated to voice them. Almost always, too, he was getting in the little woman's day. Bill usually had a complaint against the company, but admitted defeat readily when his wife gave a concise explanation of the situation.

The advertising department now is planning ads which will tell impressively the story of the cheapness of natural gas. A series already has been run reciting that, for all uses for gas in the average home, the daily cost is only about 12½ cents—less than the price of a package of cigarettes, an ice cream soda or sundae, other 15-cent commodities or 15-cent combinations of commodities, were strikingly illustrated.

The home service department has finished a series of tests on just what 1 cent's worth of natural gas will do. The results of these tests are expected to make excellent advertising material. When the company reduced its rates in 1931, the advertising gave the percentage of decrease in other necessities of life, which ranged from 10 to 15 per cent, while pointing out that the gas rate reduction amounted to 21 per cent. Publicity, which was used by nearly every newspaper on the system, included a "box" which told how much farther the gas dollar would go this year than last.

Officials of the Oklahoma Natural Gas Corp. believe its public benefit endeavors have proved most helpful not only to the communities in which the company operates, but also to the company itself as a result of increased understanding of the company's problems and a realization of the sincerely human viewpoint of the gas company and its organization.

A Discussion of Flues for Gas Appliances

(Continued from Page 20)

Effect of Altitude

In substituting Q for q into equation 11 the atmospheric pressure correction was omitted. In the majority of locations the effect of barometric pressure need not be considered. Where there is a material reduction below 30 inches of mercury equation 12 and subsequent equations should contain this correction. The capacities in Table No. 2 and 3 are based upon 30 inches and may be corrected to any other barometer by direct proportion.

Apartment House Flues for Gas Appliances

The choice of the proper size of flue for gas appliances in an apartment building, where the horizontal runs enter the flue at many levels, is a special case for which Table No. 2 may be used. The size of each section of flue between floors may be determined by considering the load of all appliances below that section as being concentrated at its base, and the height as if it were to extend upward to the top of the chimney. Another method would be to consider the total input of all floors concentrated at the top floor and, using the distance from this point to the top of the chimney, to obtain from Table No. 2 the size of flue for the top section, which size should be maintained throughout the flue length. The size of the horizontal run at each floor may be determined by using the table to find the independent flue size for the load on that floor.

There are, however, so many special conditions for such a problem that a simpler equation may be utilized and a more general procedure developed. It is likely that the building will be so designed that the length of run from the appliance to the flue will

TO INCREASE YOUR SALES

HE'S ALL RIGHT
this home is heated by Natural Gas
Natural Gas will maintain this Comfort Zone at low cost
65°
75°
WHY, certainly it is right to let him have the spacious floor to play on! When all the room is kept to "Comfort Zone" warmth of 65 to 71 degrees by Controlled Natural Gas heat he can't be cold—no matter how chilly the outside weather. It is healthful heat because only warmed air comes from the heater or furnace fired by gas, since all products of combustion pass outdoors through a special flue.
Women who live in homes kept warm by Natural Gas Controlled Heat know that the Comfort Zone of warmth thus evenly maintained does much to eliminate the constant colds and the other chronic illnesses that come from uneven temperature in the house.
Housekeeping, too, is made infinitely easier once Natural Gas heating equipment is installed. Painted and papered walls retain their freshness and bright colors. Ceilings do not show grey ribs of lath. Draperies do not become dull in color. Natural Gas is a clean fuel and because it brings in no dirt, it creates none.
Install Natural Gas Heating equipment and stop worrying about the days when the house first gets too cold and then too hot, or the days when another winter cold spreads through the family. A nearby P. G. and E. office or gas heating dealer is ready to serve you. See them today, right now. Then enjoy comfortable, healthful heating that is without disappointments or interruptions.
CONTROLLED HEAT
GAS
CONTROLLED GAS HEAT
SEE YOUR DEALER OR THE
P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

TIE IN *With this BUSINESS BUILDING* CAMPAIGN

"Nice and warm in here!"
"Yes, but we never had real comfort until Gas Heating was installed"
Natural Gas will maintain this Comfort Zone at low cost
65°
75°
Can you say this about your home?
NO WONDER guests envy the owner of a house that is always kept to Comfort Zone warmth by Controlled Natural Gas heat. But unless they too have Natural Gas heating equipment, they only know half of the story. The other wonderful half of Comfort Zone gas heat is that part which saves countless steps to the basement, that permits quick, instantaneous heat without the need of building a big fire, that delivers clean heat in abundance and because it brings in no dirt will not smudge the drapes and furnishings.
Perhaps you are one of the thousands who have made up their minds to enjoy this flexible, convenient, and carefree method of house heating. You are determined that your family will not shiver through another winter. You are tired of fuel-eating equipment and messy work. Your wife, too, is sick of constant attending during the day. Then you should install Controlled Heating with Natural Gas and stop worrying.
Join now the thousands of people who have turned to the convenience and cleanliness and carefree comfort of Natural Gas heating equipment. This wave of favorable acceptance of Controlled Comfort Zone heat by Natural Gas has been going on for nearly three years—ever since the P. G. and E. brought this better, cleaner, and more economical fuel into Northern and Central California. Today more than 143,000 households praise this better fuel.
It makes no difference whether your house is large or small, there is efficient Natural Gas Heating equipment to meet every requirement. See your heating dealer or visit the local office of the P. G. and E. and select the type of heating equipment best suited to your needs.
CONTROLLED HEAT
GAS
CONTROLLED GAS HEAT
SEE YOUR DEALER OR THE
P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

RIDE with the rising tide of gas appliance sales. You can do this by tying in with the business building advertising which Pacific Gas and Electric Company is sponsoring in the interests of the entire Northern California gas industry.

Two large-size advertisements—to appear in local newspapers during October—are reproduced here in miniature. These and many others invite prospects to visit their dealers' stores.

Interested prospects will probably say to themselves, "WHICH dealer should I see, and WHERE is he located?" As you may see by the newspaper page reproduced here, many dealers know the value of answering these questions.

PREPARE NOW FOR WINTER HEATING
SEARS
Hercules Gas Floor Furnace!
$33.00
This tells the story!... why thousands install gas heating equipment now
JUST GOOD BUSINESS TO TAKE ADVANTAGE OF THE LOW
SUMMER PRICES
OFFERED THIS MONTH ON GAS HEATING EQUIPMENT
SPARK Gas Heater
INVESTIGATE
10% DISCOUNT
WINDSOR GAS FURNACES
ALL MAKES OF HEATING EQUIPMENT AT PEFFER'S
Don't Pay a Cent Until October 1st
GAS Heaters $28.00
PEFFER

They assure themselves of increased sales by having their advertising published in space adjoining each P. G. and E. advertisement. Scores of Northern California dealers are using this economical method, tie-in advertisng, to tell prospects WHERE to buy the gas heating equipment featured by this Company.

To increase your sales, use tie-in advertising.

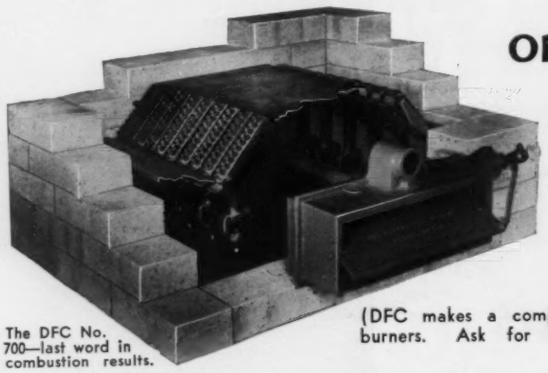
WG-210-1032

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

OWNED · OPERATED · MANAGED BY CALIFORNIANS

An Advanced Design on Proved Principles



The DFC No. 700—last word in combustion results.

Builds satisfaction and pay load in the domestic and smaller boiler field.

(DFC makes a complete line of industrial gas burners. Ask for Bulletins 305a, 306, 307.)

A—45° Nozzles direct hot gases against water legs. Efficient, fast heating.
B—Requires no furnace draft—inspirates air necessary for combustion.
C—Meets any installation requirement in the domestic or small boiler field.

DISTRIBUTORS:
S. Herbert Lanyon
408 Call Bldg.
San Francisco
Parsons Engineering Co.
458 So. Spring St.
Los Angeles
S. & S. Engineering Co.
2417 No. Ashland Blvd.
Chicago
A. F. Heineman
803 Wabash Bldg.
Pittsburgh, Pa.

Write for complete information

The DENVER FIRE CLAY CO.

Denver, Colo., U. S. A.

Thanks

for this Ovation

The reception accorded the Series 34 Madsen Cuisine Range has been nothing less than an ovation. This smart, new super-efficient range has aroused more interest in the modernization of hotel, restaurant and institutional kitchens than any other item of heavy duty natural gas equipment in a decade.

Write for our complete catalog, or have a representative call with full details. To not know Series 34 Madsen Cuisine is not to be abreast with current development in natural gas equipment.

MADSEN IRON WORKS, LTD.

P. O. Box 601, Huntington Park, Calif.
(Suburb of Los Angeles)
San Francisco Factory Representative:
Fred R. Sanford, 837 Howard St.

Madsen Hotel and Restaurant Kitchen Equipment
Sold by Leading Equipment Dealers

VALUE

Payne

THE VALUE of your manufacturer connection lies in these features:—

Quality products
Complete line
Helpful service
Responsibility
Fair Prices.

Have you ever given us a real opportunity to be your gas furnace manufacturer connection?

PAYNE FURNACE & SUPPLY CO.
Since 1914
Beverly Hills, Calif.

be short. When central plants supply hot water as well as heat for the building, the equipment in the apartment itself will be simple. The run will probably rise from the appliance and enter the flue near the ceiling, its vertical length exceeding the horizontal; if not, it will be so short that the resistance will be small. The "horizontal runs" in most cases, therefore, are not of very great importance so that the flue may be designed independently.

Assuming the same dilution of the products of combustion, the same roughness of surfaces as for domestic appliances, and, eliminating the resistance of the horizontal run, equation (17) becomes:

$$R = {}_2 .4 \frac{L}{D} \qquad (22)$$

Equation (18) becomes:

$$\text{B.t.u. per Hr.} = 2289 \left[\frac{D^5 H}{L}\right]^{1/2} \qquad (23)$$

H and L may, now, be canceled as they refer to the same distance (from the flue opening at each successive floor to the top of the chimney), providing the flue is without turns.

Therefore, for the flue, independent of runs:

$$\text{B.t.u. per Hr.} = 2289 \ [D^5]^{1/2} \qquad (24)$$

There is some question as to whether this equation is sufficiently conservative when the only or principal appliance in each apartment is a range. A certain amount of dilution will occur at each floor where the appliances are inoperative and at a time when they are not supplying heat to the flue. This is not serious, as air will be drawn into the flue only when the flue has sufficient draft to accomplish this action. However, the facts that a flue of this type may at times have a decided chilling effect upon the products of combustion and that the ventilating systems of apartment buildings may tend to neutralize the chimney drafts make it necessary to consider an additional safety factor.

By assuming an average stack temperature of 100° F. (see Table No. 4), equation (24) becomes:

$$\text{B.t.u. per Hr.} = (0.71)\ (2289)\ [D^5]^{1/2} = 1625\ [D^5]^{1/2} \qquad (25)$$

Although 100° F. is slightly below the dew point of the products of combustion after being twice diluted 100 per cent with air, and aside from a consideration of the vapors derived from cooking, equation (25) is recommended. The purpose is to provide an additional safety factor for other contingencies as well as for the possibility of low temperatures.

Fig. 1 shows the relation between the B.t.u. input and the diameter as calculated from equation (25). The sizes as read from this curve must be used only in accordance with the following procedure and for flues in apartment buildings where the horizontal runs may be neglected.

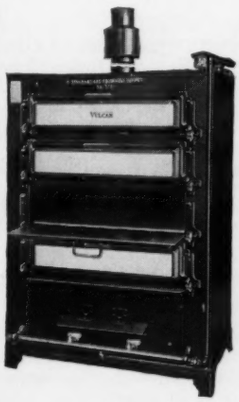
(a) The entire input may be considered as concentrated at one point and the corresponding diameter taken from Fig. 1 used as the diameter throughout the height of the flue.

(b) Where construction costs favor a change in size of flue at different levels, the diameter for each section between the floors may be determined and the changes in size made at such levels as are convenient.

The selection of the size in each section is obtained by considering the total input which the section must carry (from floors below) and using the curve to obtain the diameter.

How to hold *(and increase)* your heavy duty cooking load

No. 3764
Deep Fat Fryer



No. 3761
Insulated Bake Oven

No. 3758
Radiant Surface Broiler

WHAT must you do to hold and increase your heavy duty cooking load? There is but one answer . . . to replace obsolete equipment with the latest gas cooking equipment that proves the superiority of gas as a cooking fuel.

To interest prospects in these times you must show them that gas cuts cooking costs and improves service. Vulcan provides you with some "brass tack" points that should interest any prospect:

1. Heat losses and gas consumption in oven cooking are reduced by heavily insulated oven walls.

2. Overheated ovens and resultant food shrinkage and waste of gas are prevented by oven heat control.

3. Oven heat is used more effectively in baking and roasting by improved flue system.

4. Top cooking is made more efficient by All-Hot-Top. Heat of one burner spreads under entire top. All rings of burner heat top quickly; then one ring keeps it hot economically.

5. Labor costs are reduced because equipment requires less watching due to automatic control . . . smooth front is kept clean with less work. More comfortable working conditions increase efficiency of help.

6. Insulated, heat controlled deep fat fryer cuts fat costs 25% or more, and assures better fried food.

7. Insulated, heat controlled bake oven assures uniform results every time with lower fuel consumption.

8. Radiant broiler cuts fuel costs, speeds up service and gives a superior quality of broiled food.

Assign one or more men to consistently check up every heavy duty cooking installation on your mains. You will find many opportunities to replace obsolete equipment and hold and increase your cooking load.

Ask for copy of the new Vulcan catalog containing data on the most complete line of heavy duty cooking equipment ever offered.

VULCAN

VULCAN EQUIPMENT MAKES GAS THE MODERN EFFICIENCY FUEL—CLEAN, FAST, ECONOMICAL

STANDARD GAS EQUIPMENT CORPORATION
20 East 41st Street, New York City
New York . Philadelphia . Baltimore . Chicago . Boston . Birmingham

Pacific Coast Distributor:
Northwest Gas & Electric Equipment Co., Portland, Oregon

No. 4751
All-Hot-Top Range

The Crank that does a good turn

The Daniel Orifice Fitting is years ahead. Just a turn of the crank and the orifice plate is raised, up out of the line, ready for replacement. Rapidly becoming standard equipment. Have you seen it operate?

DANIEL ORIFICE FITTING

J. A. CAMPBELL CO.

Manufacturers of Gas Specialties and Volz Regulators

P. O. Box 669 Long Beach, Calif.

Fraser Console

Circulating Heaters
5 Sizes—2 Finishes
Crinkled Walnut Baked Enamel or
Grained Walnut Porcelain Enamel

Manufactured by

Fraser Furnace Company
Stockton, Calif.

Distributed by

H. R. BASFORD CO. San Francisco Los Angeles

"Antileke"

The hypo-sealed pipe joint saves 20% to 50% in laying cast iron or steel pipe and repairing any ordinary or difficult gas leaks.

Thousands in use without a single failure.

GAS & ELECTRIC FACILITIES, LTD.
447 Sutter St., San Francisco

Send literature and prices on "Antileke"

Name.....

Address.....

City.....State.....

"Handbook of Anthony Joint Cast Iron Pipe and Fittings"

United States Pipe and Foundry Co., Burlington, New Jersey, announces the publication of "Handbook of Anthony Joint Cast Iron Pipe and Fittings." The handbook is designed for distribution to superintendents, engineers, and officials of the gas industry, and contains detailed information covering the design and installation of Anthony joint deLavaud centrifugal cast iron pipe. The joint is primarily designed for medium and high pressure gas service but may be installed for low pressure service as well. The handbook is profusely illustrated throughout. Copies may be obtained by writing the company at the above address.

Red Oak-Shenandoah Line to Add Three New Gas Towns

Construction is underway on the lateral to serve natural gas in Shenandoah, Red Oak and Essex, Iowa, from the main line of the Natural Gas Pipe Line Co. of America, the line to be laid through Red Oak and Essex, with Shenandoah as its southern terminus. Iowa-Nebraska Light & Power Co. serves water gas in Red Oak, and butane gas in Shenandoah. Both systems are being prepared for the change-over. Essex will receive gas service for the first time.

Houston Gas and Fuel Co. Placed in Receivership

The Houston Gas and Fuel Co., Houston, Texas, was placed in the hands of a receiver September 24 by Federal Judge Randolph Bryant upon application of the Fidelity-Philadelphia Trust Company of Pennsylvania, holder of the first lien on the mortgaged property.

R. B. Creager of Brownsville, Republican national committeeman of Texas, was appointed the temporary receiver. Bond was set at $25,000.

A. M. Byers Co. Publishes Booklet on Welding Procedure

"The Welding of Genuine Wrought Iron," a four-page folder recently published by A. M. Byers Co., Pittsburgh, Pa., contains interesting practical information on procedure for welding wrought iron. Also included in this publication are engineering data on the other properties and characteristics of wrought iron. Copies may be obtained by writing to the Engineering Service Department, A. M. Byers Co., Clark Building, Pittsburgh, Pa.

Guthrie Gas Service Co. Awarded 25 Year Franchise

Guthrie Gas Service Co., which is affiliated with the Lone Star Gas group, on September 20 was granted a 25-year franchise by the voters of Guthrie. The company had been operating without a franchise for several years.

Houston Gas Dept. to Ask Loan

The Gas Department of the City of Houston, Texas, is reported to be planning to make application to the Reconstruction Finance Corp. for $50,000 to rebuild the Magnolia Park gas plant.

Votes Bonds for Municipal Gas System

The City of Hugoton. Kansas, recently voted bonds for construction of a municipal gas distribution system in that town.

THE NEW ROPER *Lines* FOR 1933

GAS RANGES WITH S.A.*

***Sales Appeal*—The New Ropers have IT! Seven new major lines are now ready for you—models completely modern from flue to leg—with new features—new improvements—new color trims—new designs.**

They bear the Roper Guarantee, meaning utmost quality, high grade materials, and expert workmanship. Prices are RIGHT.

Be an "early bird"—cash-in on the optimism that is already gathering force due to revived business. Get samples on your display floor and let "Sales Appeal" start working on your prospects. Write or wire for complete details on these new creations right now—TODAY!

These Features Will Bring Sales For You Now and in 1933!

- Insta-Matic FULL AUTOMATIC Control.
- Combination Oven Heat Control and Oven Cock.
- Ventilated Oven or INSULATED-Ventilated Oven.
- Insta-Flame Automatic Oven and Top Burner Lighter.
- Sani-Speed Top—new design—with open finger or slotted lids.
- Aluminum ASTOGRIL Broiler — the latest broiling development.
- Stainless Enamel horizontal surfaces.
- Self-Slide Broiler—slides out and in like a drawer.
- Cabinet Base for Console-type ranges.
- Easy-sliding Utility Drawer.
- Top Grate Cover.
- High Shelf with Top Rail.
- Flue Heat Deflector built into Top Rail.
- Lifetime Cooking Chart on oven door lining.
- Porcelain Enamel Oven Linings.
- Cast-iron Construction.
- New Cushioned Panels.
- New color trims.

ROPER

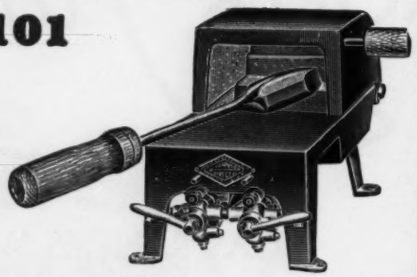
GEO. D. ROPER CORPORATION • Rockford, Illinois

PACIFIC COAST BRANCH: C. B. BABCOCK, 135 BLUXOME ST., SAN FRANCISCO

A Good Bench Furnace For School Shops

JOHNSON No. 101

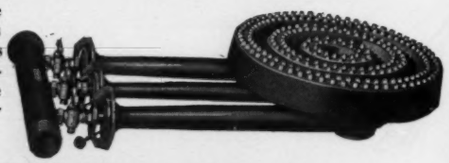
The Johnson No. 101 Bench Furnace has been a favorite in school shops throughout the country for many years. Its popularity is well deserved. Low in first cost—sturdy, dependable, and unusually efficient. Operates perfectly without expensive blower. Our catalog lists all standard gas burners and appliances.



JOHNSON

Triple Atmospheric Ring Burners

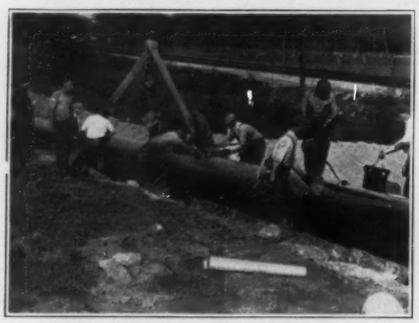
The 60BCE Ring Burner is made up of three independent burners which can be used singly, in pairs or in triple. This one burner assembly will perform a wide range of heating operations. Write for full details.



JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Pacific Coast Representative—C. B. BABCOCK CO.
135 Bluxome St., San Francisco, Calif.

NO-OX-ID Master Coat



—protection supreme

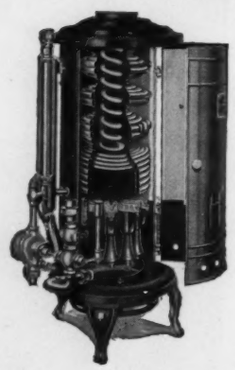
The Dearborn NO-OX-ID Master Coat provides thorough, chemical protection against elements of corrosion, incased in a mechanical protection. This coat is based upon all that has been valuable in research and experience with pipe line protection.

Recommendations and Estimates Submitted Gladly.

DEARBORN CHEMICAL COMPANY
LOS ANGELES:
807 Mateo Street, Phone TRinity 3385
SAN FRANCISCO
421 Bryant St., Phone SUtter 8688

NO-OX-ID IRON-RUST
TRADE MARK
The Original Rust Preventive

HOFFMAN



Low Prices alone mean little but Low Prices and High Quality mean everything. You can make money with HOFFMAN.

Details on request.

THE HOFFMAN HEATER COMPANY

1701 Dixie Highway
Louisville, Kentucky

Pacific Gas and Electric—Standard Oil Deal before Commission

Pacific Gas and Electric Co., San Francisco, Calif., has extended the time limit for holders of Pacific Public Service Co. first preferred stock to exchange for Pacific Gas and Electric common until October 18.

The agreement between Pacific Gas and Electric Co. and Standard Oil Co. of California for Exchange of stock will be carried out according to the contract, with the approval of the California Railroad Commission.

Negotiations are now being completed between Pacific Gas and Electric Co. and the Standard Oil Co. of California for transfer to P. G. and E. of the properties of the Pacific Public Service Co. Arrangements are reported to be pending for the purchase of the Natural Gas Corp. of Oregon and the Natural Gas Corp. of Washington by Thebo, Starr and Anderton, Inc., leaving only the California properties to be transferred to P. G. and E. through the purchase of the Pacific Public Service Co.

Cities Service Gas Co. Wins First Round in Kansas Rate Fight

On Monday, September 19, Judge Phillips of the United States Circuit Court of Appeals of Kansas issued a temporary order restraining the Kansas Public Service Commission from putting into effect its recent decision ordering a 30 cent gate rate to be charged by Cities Service Gas Co. At the same time an order was issued restraining the attorney general of Kansas from taking action to enforce the commission's order. This latter order also restrained the attorney general from taking any action on receivership proceedings against the company, ordered by Governor Woodring.

A three-judge court composed of Judge Orie Phillips, Judge George T. McDermott and Judge Richard J. Hopkins will decide if the restraining order is to be permanent.

Sales and Service Manual By Payne Furnace and Supply Co.

Payne Furnace and Supply Co., Beverly Hills, Calif., has issued the first part of a sales and service manual and handbook containing engineering data, facts and figures on warm air furnace installations, and sales information. The book at present contains 110 pages in loose-leaf form, which may be added to as new developments are announced. Eventually the book will contain about 200 pages. The book is bound in fabricoid leather, embossed with gold, and contains many line drawings and other illustrations.

Ontario, Ore., to Be Served from Wells Near the Town

George Thorsen, Ontario, Ore., plans to construct a natural gas transmission line from a newly discovered gas area to Ontario, a distance of 6 miles. Construction operations will begin within 6 months, and should the field provide sufficient supply, lines will be constructed to other towns in the district. Mr. Thorsen was granted a franchise at Oregon in Setpember. The discovery well is reported producing about 5,000,000 cubic feet daily.

20-Mile Line to Take Natural to Iowa City from Chicago Carrier

Options and rights-of-way are now being secured for a lateral to be constructed from the main line of the Natural Gas Pipe Line Co. of America to Iowa City, Iowa, where the Iowa City Light & Power Co. now serves manufactured gas. The new line will be approximately 20 miles long.

THE WILCOSTAT

Room Temperature Control

FOR GAS FIRED SPACE HEATERS

COMFORT and ECONOMY. Both are features which are easily sold and which command a ready market.

The WILCOSTAT used on a space heater gives the comfortable and healthful atmosphere of perfectly controlled room temperature. Customers are more satisfied and gas heating is readily accepted.

ECONOMY in operation and low initial cost make the Wilcostat a quick seller and easy to merchandise. Actual savings in operation quickly pay for its cost. A large number of Wilcostats are now installed and every user is a booster for gas heaters.

Every space heater user is a prospect for the Wilcostat. Thousands of present space heater installations can be easily converted to automatic operation at a low cost to give the utmost in comfort and economy. This market is ready *now*. The sales and profits are *assured*. Every merchandiser of gas appliances can easily build up a profitable addition to their heater business with practically no effort.

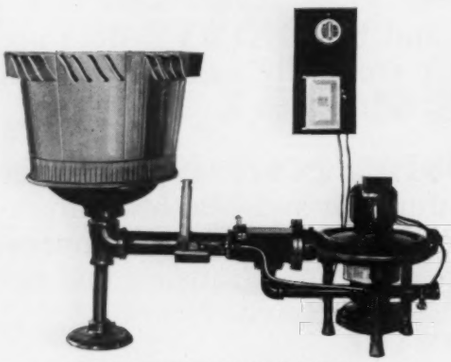
New space heater sales are the easiest Wilcostat prospects. Don't neglect the extra profit to be obtained by selling a Wilcostat with every *new* space heater.

USE the Wilcostat on CIRCULATORS FLOOR FURNACES, GAS-STEAM RADIATORS, GARAGE HEATERS.

THE WILCOLATOR COMPANY, Newark, N. J.

Specialists in Temperature Control for Household Appliances

Ready for the Market!
The New
PARAMOUNT
CONVERSION GAS BURNER



It is the cheapest, most efficient, durable, simple, fully automatic, positively safe, COMPLETE Conversion Burner offered today. Furnished with a high grade Pilot Light, accurate snap-action Thermostat, a sturdy relay and a patented Draft Hood which improves both burner and furnace at least 10%.

It lists at $107.50 complete, with your regular Trade Discount allowed.

This size takes care of from 50 to 150 cubic feet of Natural Gas per hour. Larger sizes furnished at small increase in price.

Burner head rests on the grate bars. Grates are NOT removed.

Installed or removed in 10 minutes.

THE BIALOSKY BROS. & COMPANY
6611 Euclid Avenue
Cleveland, Ohio

The PARK WILSHIRE
HOTEL APARTMENTS

Most desirably situated on Wilshire Boulevard, adjoining beautiful Westlake Park---15 minutes from the city center. By bus directly in front of the building and by three car lines within one block.

•

Apartments from $75 a Month
Also Daily and Weekly Rates

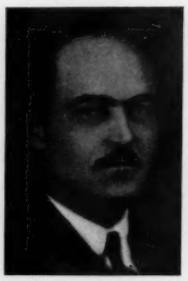
•

2424 Wilshire Blvd., at Westlake Park

•

Modern, Home-like and
Supremely Comfortable

LOS ANGELES



E. R. Duree

C. E. Brock

Duree Now With Northern Gas and Pipe Line; Brock Promoted

E. R. DUREE, who for the past 4 years has been general manager of the gas interests of The Kansas Power and Light Co. and affiliated companies, was transferred July 1 to the Northern Gas and Pipe Line Co., Omaha, Neb., as superintendent of transportation.

C. E. Brock, who was general superintendent of the gas properties, has been promoted to the position of general manager, succeeding Mr. Duree. Mr. Brock will continue to maintain his office in Salina, his many years experience in the natural gas business qualifying him for the position which he now holds.

The natural gas properties controlled from the Salina general office cover operations in Texas, Kansas and Nebraska. Companies operated out of the Salina office include The Kansas Power and Light Co., (Natural Gas Division), The Kansas Pipe Line & Gas Co., The Kansas Gas and Gasoline Co., The McPherson Oil & Gas Development Co., The McPherson Gas Co., The Kingman County Gas Co., The Peoples Gas Co. and The Public Service Co. of Kansas.

Line to Connect Two New Mexico Gas Fields Gets Under Way

Construction operations are under way on the gas transmission line from the Ute Pasture field to the Farmington field in northern New Mexico by the Fredell Construction Co. The line will connect the two gas fields and tie in with the Farmington-Albuquerque carrier. Cost of the development is estimated at $750,000.

Laramie Gas Co. Asks Permit to Serve Gas from Dutton Field

Laramie Gas Co. has made application to serve natural gas in Laramie, Wyo., from the Dutton Creek field about 25 miles southwest of the town. Construction of a line to supply the town is part of the development plans, and is contingent upon the production of enough gas to serve Laramie.

Commonwealth Consolidated Gas Co. Ltd., to Drill at Kettleman Hills

Commonwealth Consolidated Gas Co., Ltd., 1009 West Seventh St., Los Angeles, has been formed to carry on a gas drilling program in the Kettleman Hills area. According to H. R. Ryder, president of the company, expenditures will total between $2,500,000 and $4,000,000.

L. J. Pepperberg Reopens Offices at Dallas, Texas

Leon J. Pepperberg, consulting geologist and engineer, recently consulting geologist of the Columbia Engineering & Management Corp., announces the re-opening of offices in the First National Bank Bldg., Dallas, Texas.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $5.00 monthly on 12-time contract.

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Experienced town plant manager desires position. Can handle commercial jobs or act as sales manager. Understands fully distribution and sale of high and low pressure natural gas. To prove ability will work as territory salesman. Moderate salary. Has good merchandising record. Best references. Address Box E-223, *Western Gas,* 124 West Fourth Street, Los Angeles, Calif.

Jett to Manage for Muller Co. at Los Angeles

W. L. Jett, some years ago manager of the Los Angeles office for the Muller Co., Decatur, Ill., and until recently in charge of sales for the South, has returned to Los Angeles, as manager for the company in that district.

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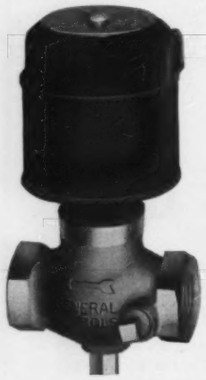

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Wailes Dove-Hermiston Buys Cement Wrapped Pipe Co.

Wailes Dove-Hermiston Corp. announces the acquisition of sales and distribution rights of the Cement Wrapped Pipe Co., of San Francisco. Activity under the new arrangement will extend throughout the United States and Canada. W. A. Kraner, inventor of the cement-motor wrapping machines, has been retained as chief engineer with W. F. Focha as assistant chief engineer.

The wrapping process is particularly adaptable as applied to steel pipe of large diameter. One of the most recent and notable contracts completed by the former company was the wrapping of 23 miles of 56-inch and 66-inch diameter pipe for the Hetch Hetchy flow line for the city of San Francisco, to which a ½-inch reinforced covering was applied. The process has likewise been developed for small diameter pipe and wood piling.

The new division of the Wailes Dove-Hermiston Corp. supplements the pipe protection service of the company's Bitumastic and Hermastic products. Engineering service and information are available at company offices, located at 345 Vermont Street, San Francisco and 2461 E. Eighth Street, Los Angeles.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.,

Required by the Act of Congress of August 24, 1912, of *Western Gas*, published at Los Angeles, California, for October 1, 1932.
State of California,
County of Los Angeles—ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Jay Jenkins, who, having been duly sworn according to law, deposes and says that he is the publisher of *Western Gas*, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher—Jay Jenkins, Los Angeles, California.
Managing Editor—George H. Finley, Los Angeles, California.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)
Western Business Papers, Inc., Los Angeles.
Jay E. Jenkins, Los Angeles, Calif.
James E. Jenkins, Los Angeles, Calif.
George H. Finley, Los Angeles, Calif.
Craig Espy, New York City.
H. Elliott Taylor, San Francisco.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above it.....
(This information is required from daily publications only.)

JAY JENKINS, Publisher.

Sworn to and subscribed before me this 22nd day of September, 1932.
(SEAL) JOSEPHINE C. WHITING.
Notary Public.
(My commission expires March 25, 1936.)

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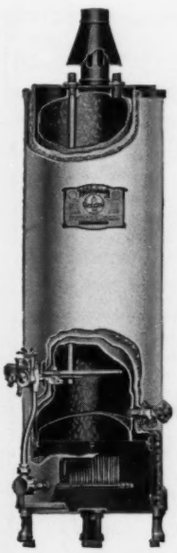

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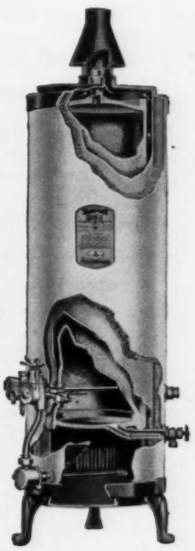

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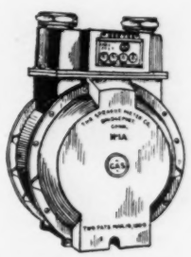

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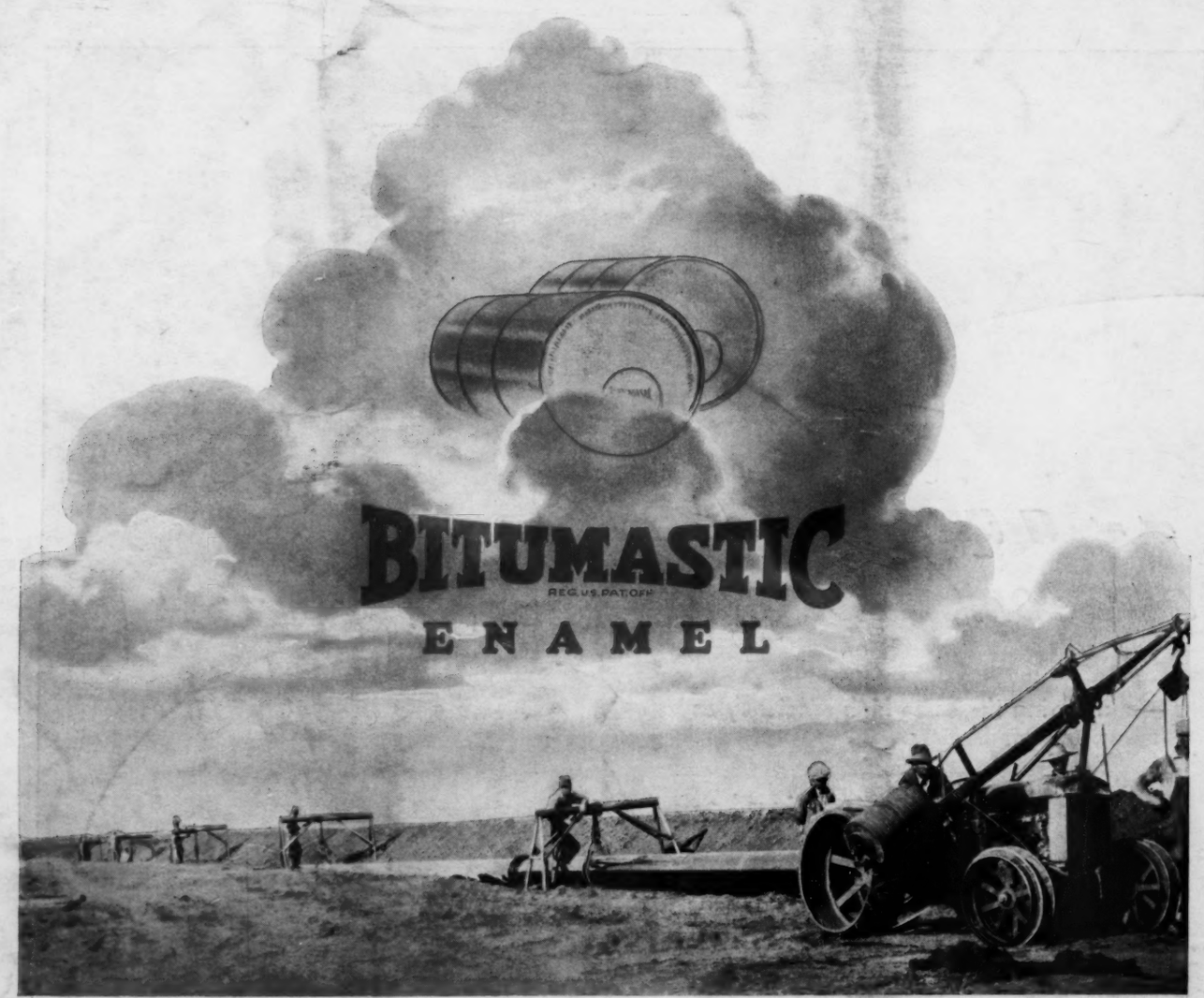

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